

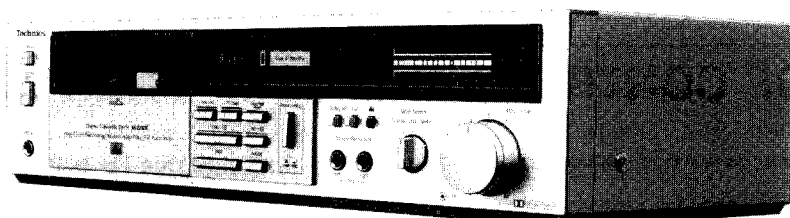
Service Manual

Cassette Deck

RS-M229X

(Silver Face)
(Black Face)

dbx/Dolby NR-Equipped
Stereo Cassette Deck



This is the Service Manual for the following areas.

- ☐ For all European areas except United Kingdom.
- ☐ For United Kingdom.
- ☐ For Asian PX.
- ☐ For European PX.

RS-M229X in black is also available in some countries.

RS-M24 MECHANISM SERIES

Specifications

Track system:	4-track 2-channel stereo recording and playback	Fast forward and	
Tape speed:	4.8cm/s	rewind time:	Approx. 90 seconds with C-60 cassette tape
Wow and flutter:	<input type="checkbox"/> ...0.05% (WRMS), $\pm 0.14\%$ (DIN) <input type="checkbox"/> ...0.048% (WRMS)	Inputs:	MIC; sensitivity 0.25mV applicable microphone impedance 400 Ω —10k Ω LINE; sensitivity 60mV input impedance 47k Ω or more
Frequency response:	Metal tape; <input type="checkbox"/> ...20—17,000 Hz 25—16,000 Hz (DIN) 30—15,000 Hz ± 3 dB <input type="checkbox"/> ...20—18,000 Hz CrO ₂ tape; <input type="checkbox"/> ...20—16,000 Hz 25—15,000 Hz (DIN) 30—14,000 Hz ± 3 dB <input type="checkbox"/> ...20—18,000 Hz Normal tape; <input type="checkbox"/> ...20—15,000 Hz 25—14,000 Hz (DIN) 30—13,000 Hz ± 3 dB <input type="checkbox"/> ...20—17,000 Hz	Outputs:	LINE; output level 400mV, output impedance 2.3k Ω or less HEADPHONES; output level 80mV (at 8 Ω) applicable headphone impedance 8 Ω —600 Ω
Dynamic range:	110dB (at 1kHz) with dbx in	Bias frequency:	80kHz
Max. input level	improvement: 10dB or more improved with dbx in (at 1kHz)	Heads:	2-head system 1-MX head for record/playback 1-double-gap ferrite head for erasure
Signal-to-noise ratio:	dbx in; 92dB Dolby [®] B NR in; <input type="checkbox"/> ...66dB (CCIR) <input type="checkbox"/> ...67dB (CCIR) NR out; 57dB (Signal level = max. input level A weighted, CrO ₂ type tape)	Motor:	1-motor system (Electrical governor motor)
		Power requirements:	<input type="checkbox"/>AC; 220V, 50-60Hz <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>AC; 110/125/220/240V, 50-60Hz <input type="checkbox"/>Pre-set power voltage 240V <input type="checkbox"/>Pre-set power voltage 125V <input type="checkbox"/>Pre-set power voltage 220V
		Power consumption:	12W
		Dimensions:	43cm(W)×10.9cm(H)×23.3cm(D)
		Weight:	4kg

Design and specifications are subject to change without notice.

* The term dbx is a registered trademark of dbx Inc.

** 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

Technics

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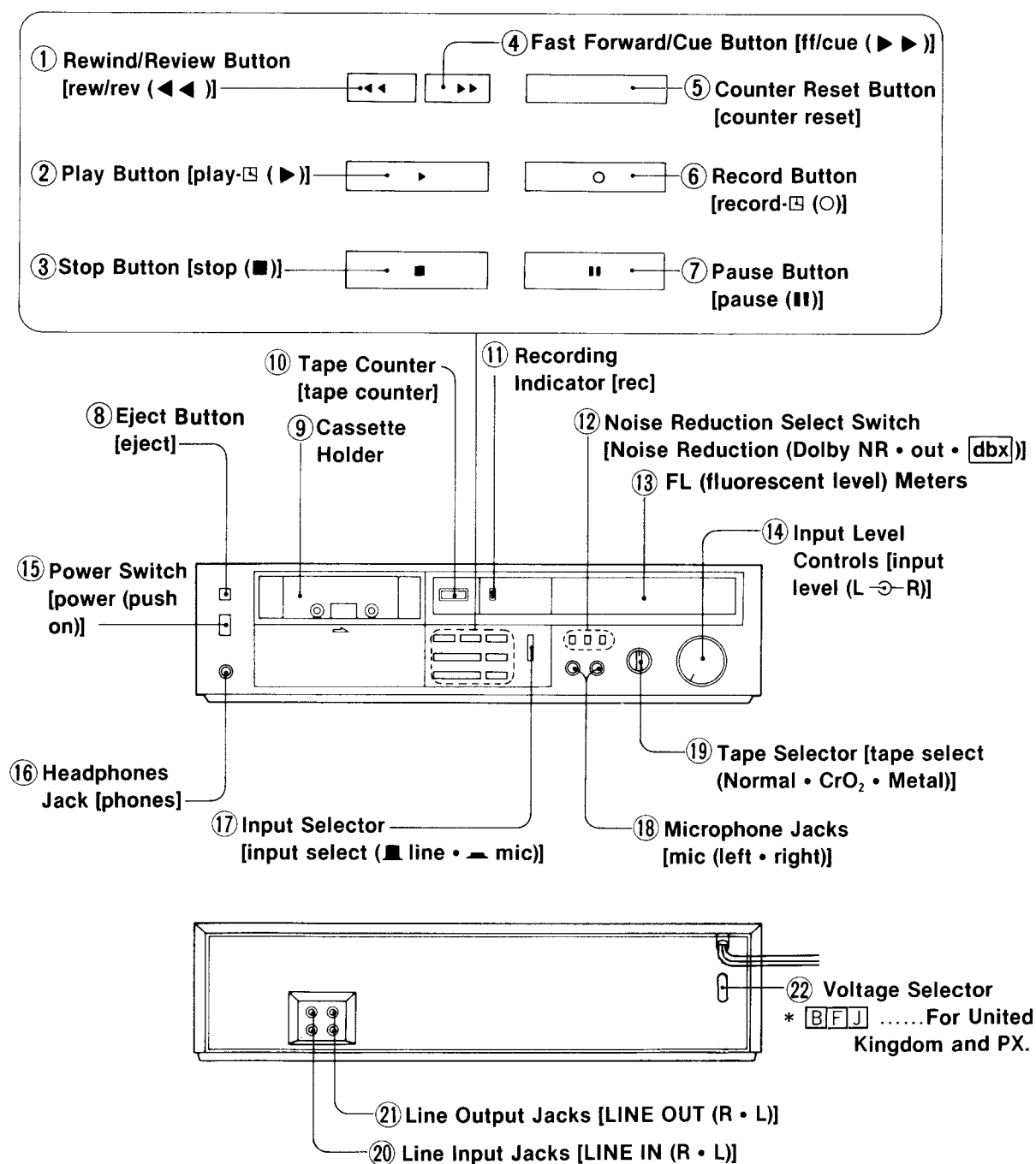
Matsushita Electric Trading Co., Ltd.

P.O. Box 288, Central Osaka Japan

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LOCATION OF CONTROLS AND COMPONENTS



DISASSEMBLY INSTRUCTIONS

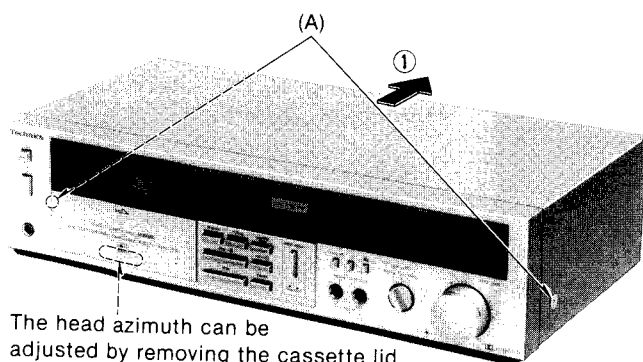


Fig. 1

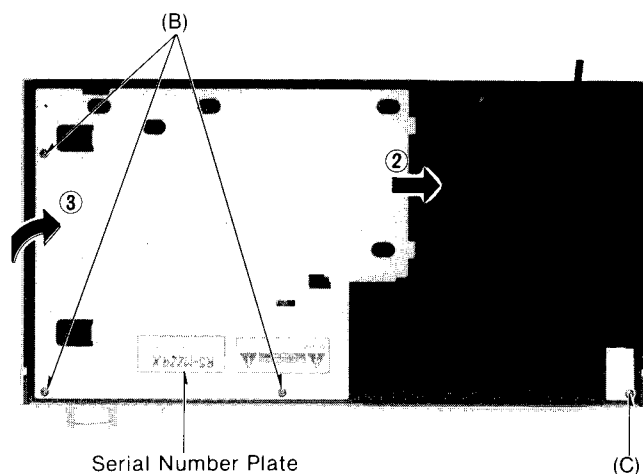


Fig. 2

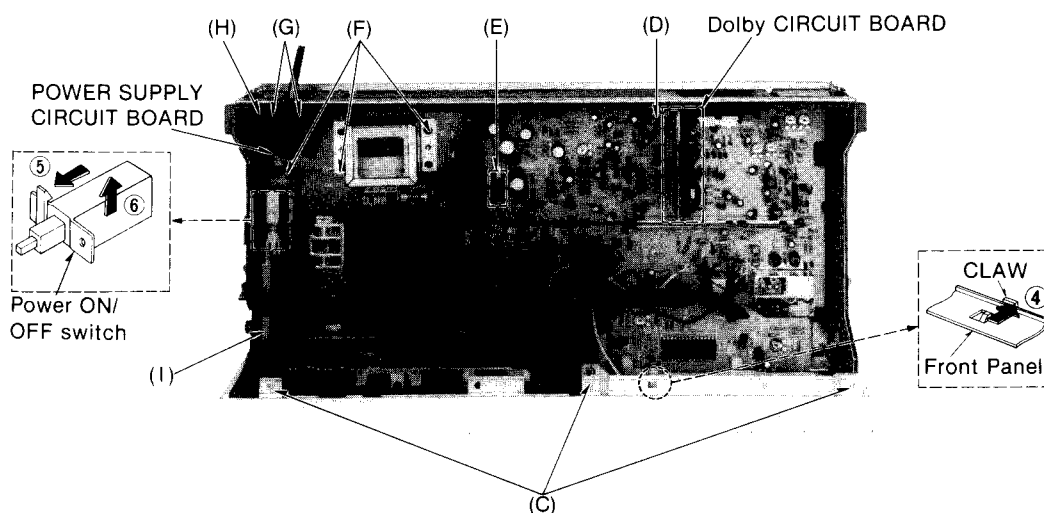
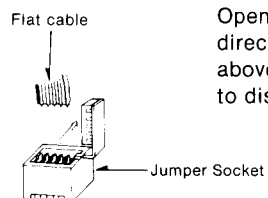


Fig. 3

(E) How to remove flat cable



Open the lid of socket in the direction of the arrow as shown above, and extract the flat cable to disconnect.

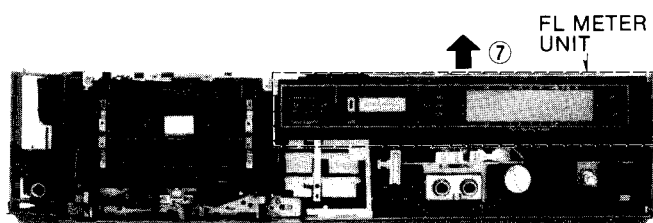


Fig. 4

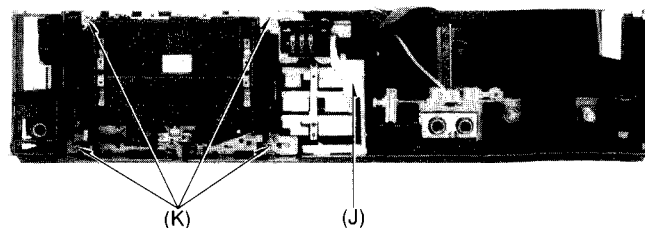


Fig. 5

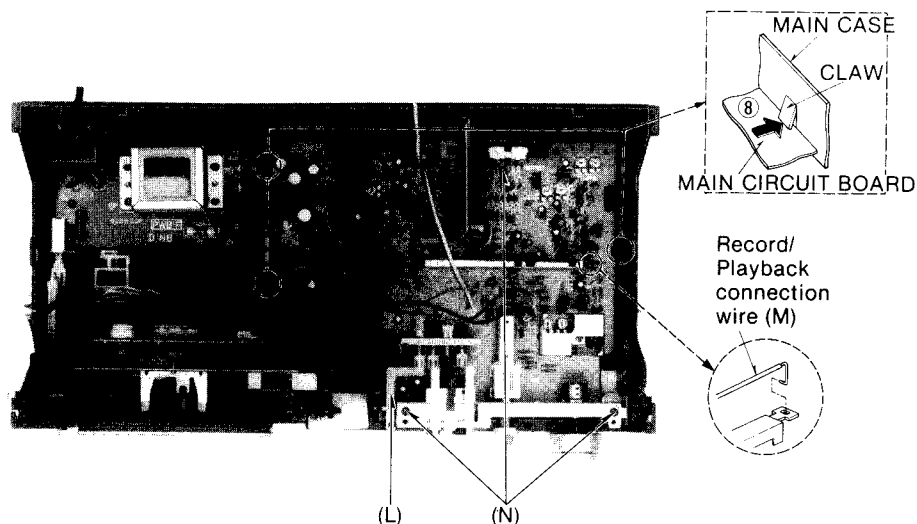


Fig. 6

Ref. No.	Procedure	To remove —	Remove —	Shown in fig. —
1	1	Main case	<ul style="list-style-type: none"> • 2 ornament screws(A) • As shown in fig. 1, slide the case cover in the direction of arrow ①. 	1 1
2	2	Bottom cover	<ul style="list-style-type: none"> • 3 screws(B) • Slide the bottom cover in the direction indicated by arrow ②, then raise the bottom cover in the direction indicated by arrow ③. 	2 2
3	1 → 2 → 3	Front panel assembly	<ul style="list-style-type: none"> • 4 screws(C) • As shown in fig. 3, push the claw in the direction of arrow ④. 	2, 3 3
4	1 → 4	Dolby circuit board	<ul style="list-style-type: none"> • 1 red screw(D) • Pull out the Dolby circuit board. 	3 3
5	1 → 5	Power supply circuit board	<ul style="list-style-type: none"> • Connector ④(E) • 3 red screws(F) • 2 screws(G) • Cord clamber(H) • Pull out the power switch rod(I) • As shown in fig. 3, push the claw in the direction of arrow ⑤, lift the power ON/OFF switch in the direction of arrow ⑥. 	3 3 3 3 3 3
6	1 → 2 → 3 → 6	FL meter unit	<ul style="list-style-type: none"> • As shown in fig. 4, pull out the FL meter unit in the direction of arrow ⑦. 	4
7	1 → 2 → 3 → 6 → 7	Mechanism unit	<ul style="list-style-type: none"> • Reset lever(J) • 4 red screws(K) 	5 5
8	1 → 2 → 3 → 6 → 8	Main circuit board	<ul style="list-style-type: none"> • Pull out the switch rod(L) • Record/playback connection wire...(M) • 3 red screws(N) • As shown in fig. 6, push the claw in the direction of arrow ⑧, then pull out the main circuit board. 	6 6 6 6

* Serial No. Indication

- The serial number plate of this product is attached to the bottom cover. (Shown in fig. 2.)

OPERATING PRECAUTIONS

- If the Record Button or the Play Button is pressed immediately after the power has gone off, the head section will remain raised. This means that the tape will not be ejected even when the Eject Button is pressed. In cases like this, switch on the power again.

MEASUREMENT AND ADJUSTMENT METHODS

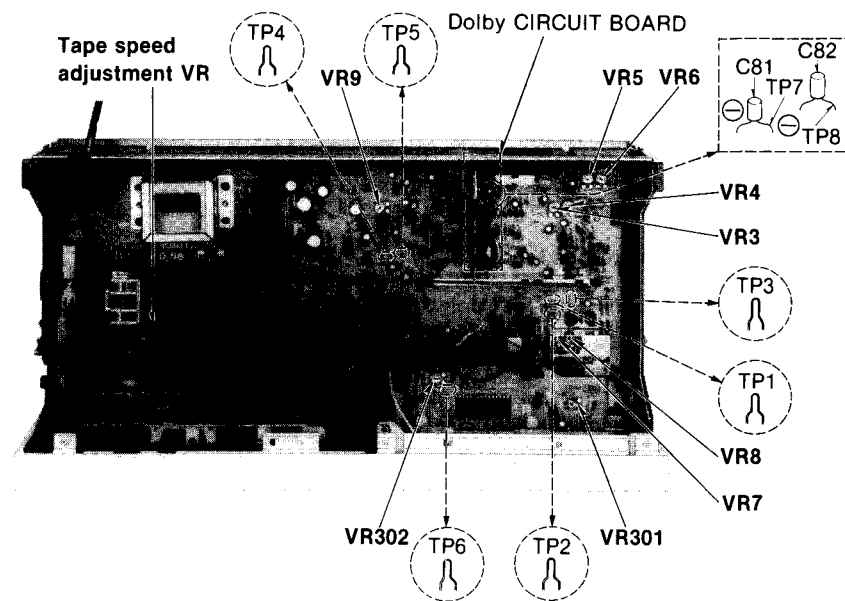


Fig. 1

NOTES: Set switches and controls in the following positions, unless otherwise specified.

- Make sure heads are clean
- Make sure capstan and pressure roller are clean
- Judgeable room temperature $20\pm5^{\circ}\text{C}$ ($68\pm9^{\circ}\text{F}$)
- NR switch: OUT
- Input level controls: Maximum

A Head position adjustment	Condition: • Playback and pause mode	
<p>(The head adjusting plate is provided to adjust the tape touch of the head in cue or review mode.)</p> <ol style="list-style-type: none"> 1. Press the playback button and pause button. 2. Measure the space between the pressure roller and the capstan. <p>Standard value: $0.5\pm0.3\text{mm}$</p> <ol style="list-style-type: none"> 3. If the measured value is not within the standard value, untighten screw (A) and slide the head adjusting plate in the direction of arrow (B) for adjustment. 		
<p>Fig. 2</p>		
E Head azimuth adjustment	Condition: • Playback mode • Normal tape mode	Equipment: • VTVM • Oscilloscope • Test tape (azimuth)...QZZCFM
<p>L-CH/R-CH output balance adjustment</p> <ol style="list-style-type: none"> 1. Make connections as shown in fig. 3. 2. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) in fig. 4 for maximum output L-CH and R-CH levels. When the output levels of L-CH and R-CH are not at maximum at the same point adjust as follows. 3. Turn screw (B) shown in fig. 4 to find angles A and C (points where peak output levels for left and right channels are obtained). Then, locate angle B between angles A and C, i.e., and point where L-CH and R-CH outputs are balanced. (Refer to figs. 4 and 5.) <p>L-CH/R-CH phase adjustment</p> <ol style="list-style-type: none"> 4. Make connections as shown in fig. 6. 5. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) shown in fig. 4 so that pointers of the two VTVMs swing to maximum and a lissajous waveform as illustrated in fig. 7 is obtained on the oscilloscope. 		
<p>Fig. 3</p> <p>Fig. 4</p>		

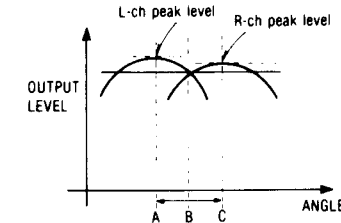


Fig. 5

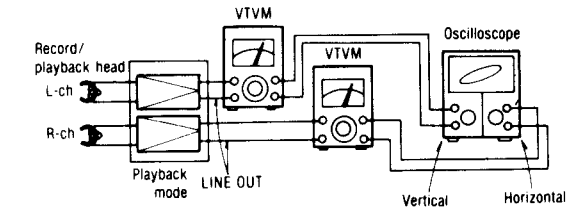


Fig. 6

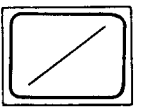


Fig. 7

C Tape speed

Condition:
• Playback mode

Equipment:
• Digital frequency counter
• Test tape...QZZCWAT

Tape speed accuracy

1. Test equipment connection is shown in fig. 8.
2. Playback test tape (QZZCWAT 3,000Hz), and supply playback signal to the digital frequency counter.
3. Measure this frequency.
4. On the basis of 3,000Hz, determine value by following formula:

$$\text{Tape speed accuracy} = \frac{f - 3,000}{3,000} \times 100(\%) \quad \text{where, } f = \text{measured value}$$

5. Take measurement at middle section of tape.

Standard value: $\pm 1.5\%$

6. If measured value is not within the standard value, adjust it by using the tape speed adjustment VR shown in Fig. 1.

Tape speed fluctuation

Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows:

$$\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3,000} \times 100(\%) \quad f_1 = \text{maximum value, } f_2 = \text{minimum value}$$

Standard value: Less than 1%

NOTE:

Please use non metal type screwdriver when you adjust tape speed on this unit.

D Playback frequency response

Condition:
• Playback mode
• Normal tape mode

Equipment:
• VTVM
• Oscilloscope
• Test tape...QZZCFM

1. Test equipment connection is shown in fig. 3.
2. Playback the frequency response portion of test tape (QZZCFM).
3. Measure output level at 315Hz, 12.5kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz, and compare each output level with the standard frequency 315Hz, at LINE OUT.
4. Make measurements for both channels.
5. Make sure that the measured values are within the range specified in the frequency response chart. (Shown in fig. 9).

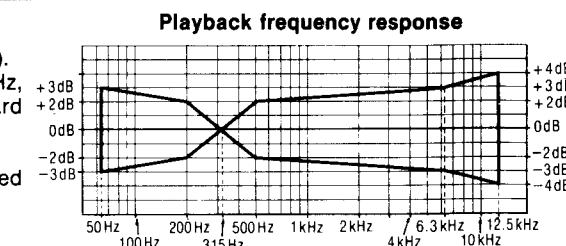


Fig. 9

E Playback gain

Condition:
• Playback mode
• Normal tape mode

Equipment:
• VTVM
• Oscilloscope
• Test tape...QZZCFM

1. Test equipment connection is shown in fig. 3.
2. Playback standard recording level portion on test tape (QZZCFM 315Hz) and, using VTVM, measure the output level at test points [TP7 (L-CH), TP8 (R-CH)].
3. Make measurements for both channels.

Standard value: 0.42V [0.38V \pm 1dB: at LINE OUT jack]

Adjustment

1. If the measured value is not within standard the adjust VR3 (L-CH) or VR4 (R-CH) (See fig. 1).
2. After adjustment, check "Playback frequency response" again.

⑤ Erase current

Condition:
• Record mode
• Metal tape mode

Equipment:
• VTVM
• Oscilloscope

1. Test equipment connection is shown in fig. 10.
2. Place UNIT into metal tape mode.
3. Press the record and pause buttons.
4. Read voltage on VTVM and calculate erase current by following formula:

$$\text{Erase current (A)} = \frac{\text{Voltage across resistor R154}}{1 (\Omega)}$$

Standard value: 155±15mA (Metal)

5. If measured value is not within stand, adjust as follows.

Adjustment

1. Short point (B) and open point (A) on the main circuit board. Refer to the wiring connection diagram on page 15.
2. Measure the erase current.
3. If the erase current is less than 140mA, short the point (A).
4. If the erase current is more than 170mA, open the point (B).

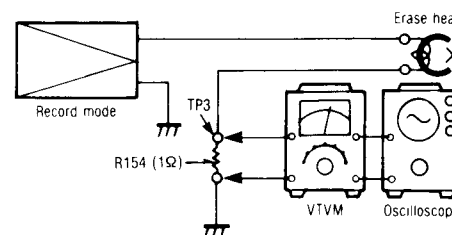


Fig. 10

⑥ Overall frequency response

Condition:
• Record/playback mode
• Normal tape mode
• CrO₂ tape mode
• Metal tape mode
• Input level controls...MAX

Equipment:
• VTVM
• ATT
• AF oscillator
• Oscilloscope
• Resistor (600Ω)
• Test tape (reference blank tape)
...QZZCRA for Normal
...QZZCRX for CrO₂
...QZZCRZ for Metal

Note:

Before measuring and adjusting, the overall frequency response make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response).

(Recording equalizer is fixed)

1. Make connections as shown in fig. 11.
2. Place UNIT into normal tape mode and insert the normal reference blank test tape (QZZCRA).
3. Supply a 1kHz signal from the AF oscillator through ATT to LINE IN.
4. Adjust ATT so that input level is -20dB below standard recording level (standard recording level = 0 VU).
5. Adjust the AF oscillator frequency to 1kHz, 50Hz, 100Hz, 200Hz, 500Hz, 4kHz, 8kHz, and 10kHz signal, and record these signals on the test tape.
6. Playback the signals recorded in step 6, and check if the frequency response curve is within the limits shown in the overall frequency response chart for normal tapes (fig. 12). (If the curve is within the charted specifications, proceed to steps 7, 8 and 9.) If the curve is not within the charted specifications, adjust as follows;

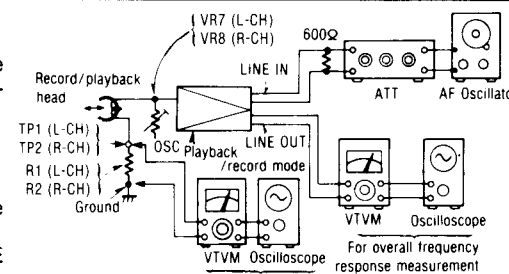


Fig. 11

Overall frequency response chart (Normal)

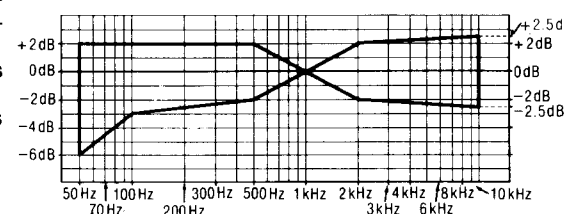


Fig. 12

Adjustment (A):

When the curve exceeds the overall specified frequency response chart (fig. 12) as shown in fig. 13.

- 1) Increase bias current by tuning VR7 (L-CH) and VR8 (R-CH). (See fig. 1 on page 5).
- 2) Repeat steps 5 and 6 for confirmation (Proceed to steps 7, 8 and 9 if the curve is now within the charted specifications as shown fig. 12.)
- 3) If the curve still exceeds the specifications (fig. 12), increase bias current further and repeat steps 5 and 6.

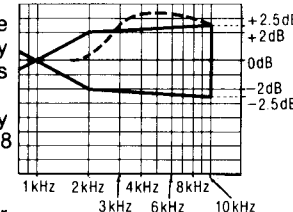


Fig. 13

Adjustment (B):

When the curve falls below the overall specified frequency response chart (fig. 12) as shown in fig. 14.

- 1) Reduce bias current by tuning VR7 (L-CH) and VR8 (R-CH).
- 2) Repeat steps 5 and 6 for confirmation (Proceed to steps 7, 8 and 9 if the curve is now within the charted specifications as shown fig. 12.)
- 3) If the curve still falls below the charted specifications (fig. 12), reduce bias current further and repeat steps 5 and 6.

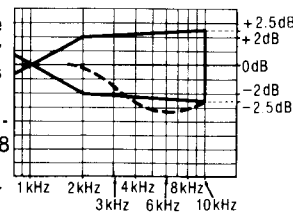


Fig. 14

7. Place UNIT into CrO₂ tape mode.

8. Change test tape to CrO₂ reference blank test tape (QZZCRX), and record 1kHz, 50Hz, 100Hz, 200Hz, 500Hz, 4kHz, 8kHz, 10kHz and 15kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for CrO₂ tapes (fig. 15).

9. Place UNIT into metal tape mode and change test tape to metal reference blank test tape (QZZCRZ), and record 1kHz, 50Hz, 100Hz, 200Hz, 500Hz, 4kHz, 8kHz and 12.5kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for metal tapes (fig. 15).

10. Confirm that bias currents are approximately as follows when the UNIT is set at different tape mode.

- Read voltage on VTVM between ground and test point (TP1 for L-CH, TP2 for R-CH) and calculate bias current by following formula:

$$\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}$$

around 400μA (Normal position)
Standard value: around 515μA (CrO₂ position)
around 720μA (Metal position)

Overall frequency response chart (CrO₂, Metal)

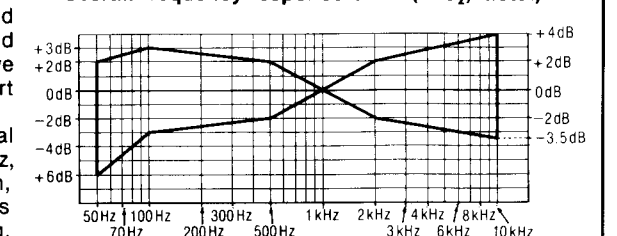


Fig. 15

⑦ Overall gain

Condition:
• Record/playback mode
• Normal tape mode
• Input level controls...MAX
• Standard input level;
MIC-71±4dB
LINE-24±4dB

Equipment:
• VTVM
• ATT
• Resistor (600Ω)
• Test tape (reference blank tape)
...QZZCRA for Normal

1. Test equipment connection is shown in fig. 16.
2. Insert the normal reference blank tape (QZZCRA).
3. Place UNIT into record mode.
4. Supply a 1kHz signal through ATT (-24dB) from AF oscillator, to LINE IN.
5. Adjust ATT until monitor level at LINE OUT becomes 0.38V.
6. Playback recorded tape, and make sure that the output level at LINE OUT becomes 0.38V.
7. If measured value is not 0.38V±2dB, adjust it by using VR5 (L-CH) or VR6 (R-CH).
8. Repeat from step (2).

Standard value 0.38V-2dB (300mV)-0.38V + 2dB (480mV)

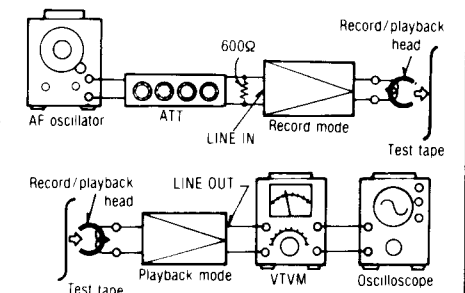


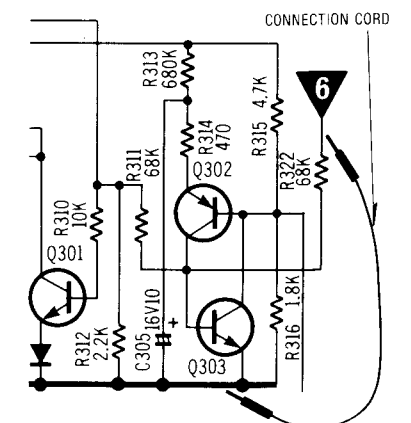
Fig. 16

⑧ Fluorescent meter

Condition:
• Record mode
• Input level controls...MAX

Equipment:
• VTVM
• ATT
• AF oscillator

1. Test equipment connection is shown in fig. 16.
2. Connect a wire between TP6 and ground (See fig. 16).
3. Supply a 1kHz signal through ATT (-24dB) to the LINE IN jack, then place the unit into the record mode.
4. Adjust the ATT so that the output level at LINE OUT becomes 0.38V (The input level at this condition is called the standard input level).
5. Adjustment at "-20dB":
A. Adjust the ATT so that input level is -20dB below the standard input level.
B. Adjust VR301 so that the -20dB segment of the FL meter lights up with the input level of -20±1dB below the standard input level (L-CH ONLY) (See fig. 20).
6. Adjustment at "0dB".
A. Adjust the ATT so that the output level at LINE OUT becomes 0.38V. (The input level at this condition is called the standard input level).
B. Adjust VR302 so that the +1dB segment of the FL meter lights up with the input level of 0±0.4dB range of the standard input level (See fig. 21).
7. Repeat twice between steps (5) and (6) above.
8. Adjust ATT and check that all segments light up when an input signal level is increased to 10dB higher than the standard input level (See fig. 22).
9. Disconnect the wire between peak reset terminal and ground, which had been connected at step 2.



BLOCK DIAGRAM (for L-CH only)

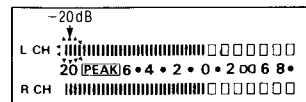
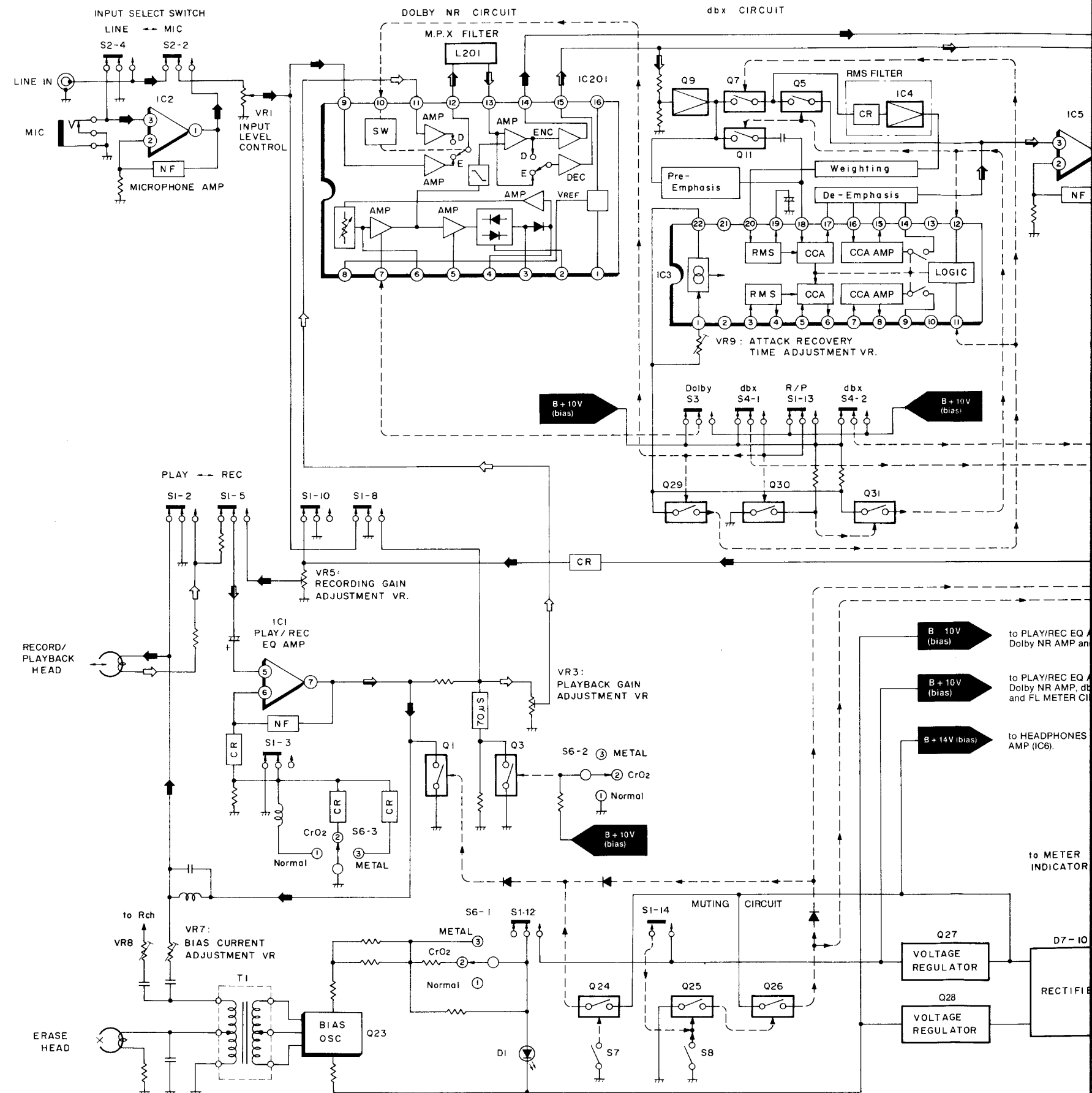


Fig. 20

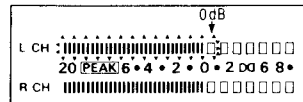


Fig. 21

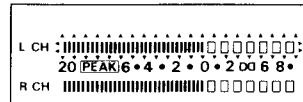


Fig. 22

Dolby NR circuit

Condition:

• Record mode

• NR select switch...

OUT/Dolby NR

• Input level controls...MAX

Equipment:

• VTVM

• ATT

• Resistor (600Ω)

• AF oscillator

• Oscilloscope

1. Make connections as shown in fig. 23.
2. Set the unit to the record mode. (NR select switch is OUT.)
3. Apply a 1kHz signal to LINE IN.
4. Adjust the ATT so that the output level at TP7 (L-CH) and TP8 (R-CH) is 17.5mV.
5. The output level at pin 14 should be 0dB.
6. Set the NR select switch to Dolby NR, and make sure that the output signal level at pin 14 of IC201 (L-CH) and IC202 (R-CH) is 8 ± 1.5 dB.

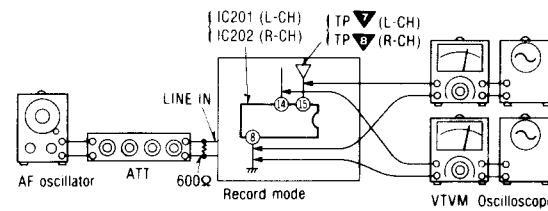


Fig. 23

Attack recovery time adjustment (dbx circuit)

Condition:

• Record mode

• Input level control...MAX

• Balance control...Center

• Noise reduction selector

...dbx

Equipment:

• VTVM

• ATT

• AF oscillator

• DC voltmeter

1. Make the connections as shown in fig. 24 and apply 1kHz -27dB signal from LINE IN, and set the noise reduction selector to dbx position.
2. Set the unit to record mode. adjust ATT so that the signal level at C79 (L-CH) and C80 (R-CH) is 300mV.
3. Read voltage on DC voltmeter.

Reference value: 15 ± 0.5 mV

4. If measured value is not within reference, adjust VR9 (shown in fig. 1).

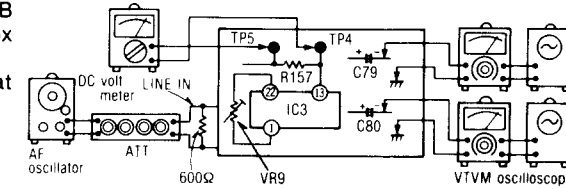
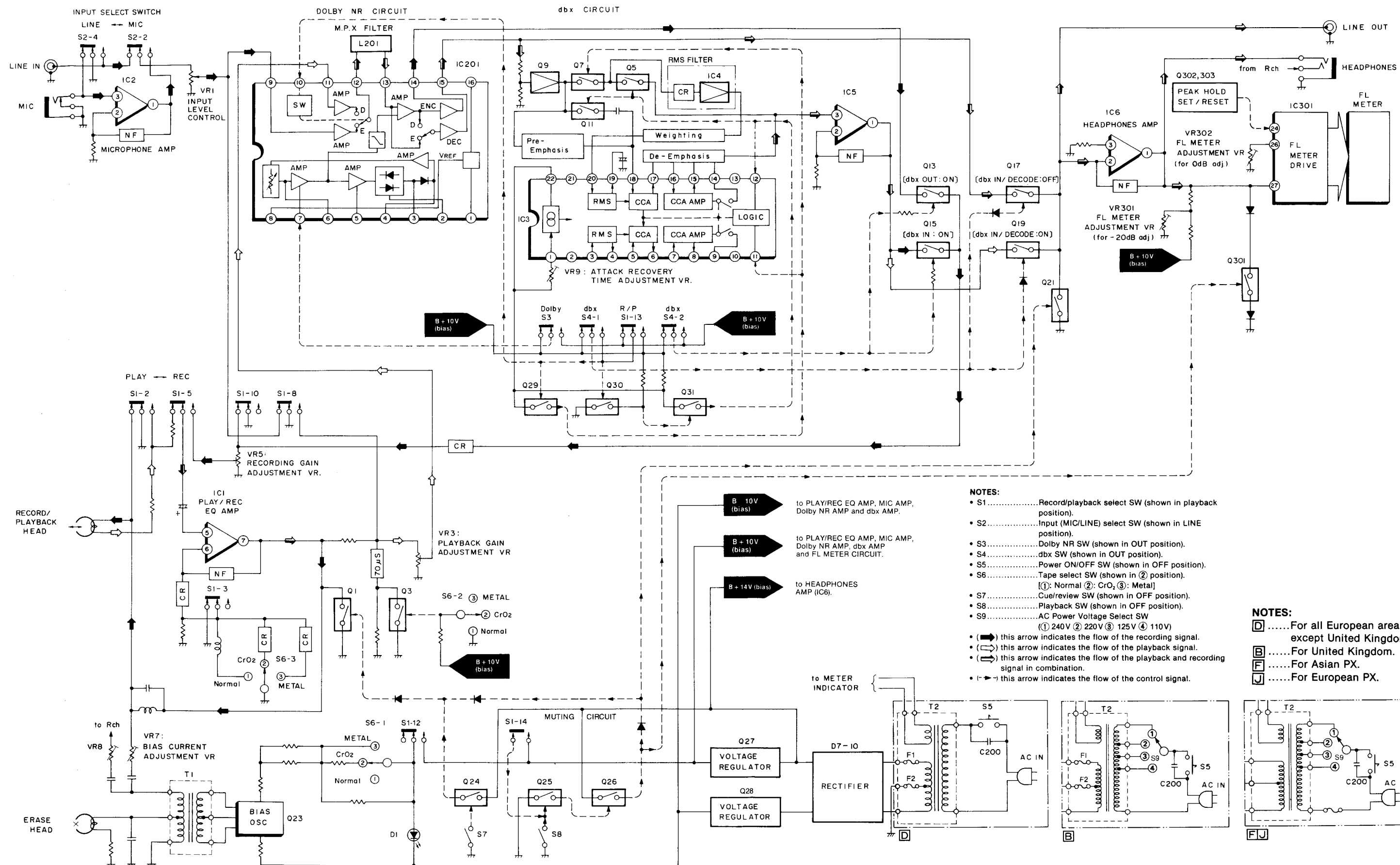
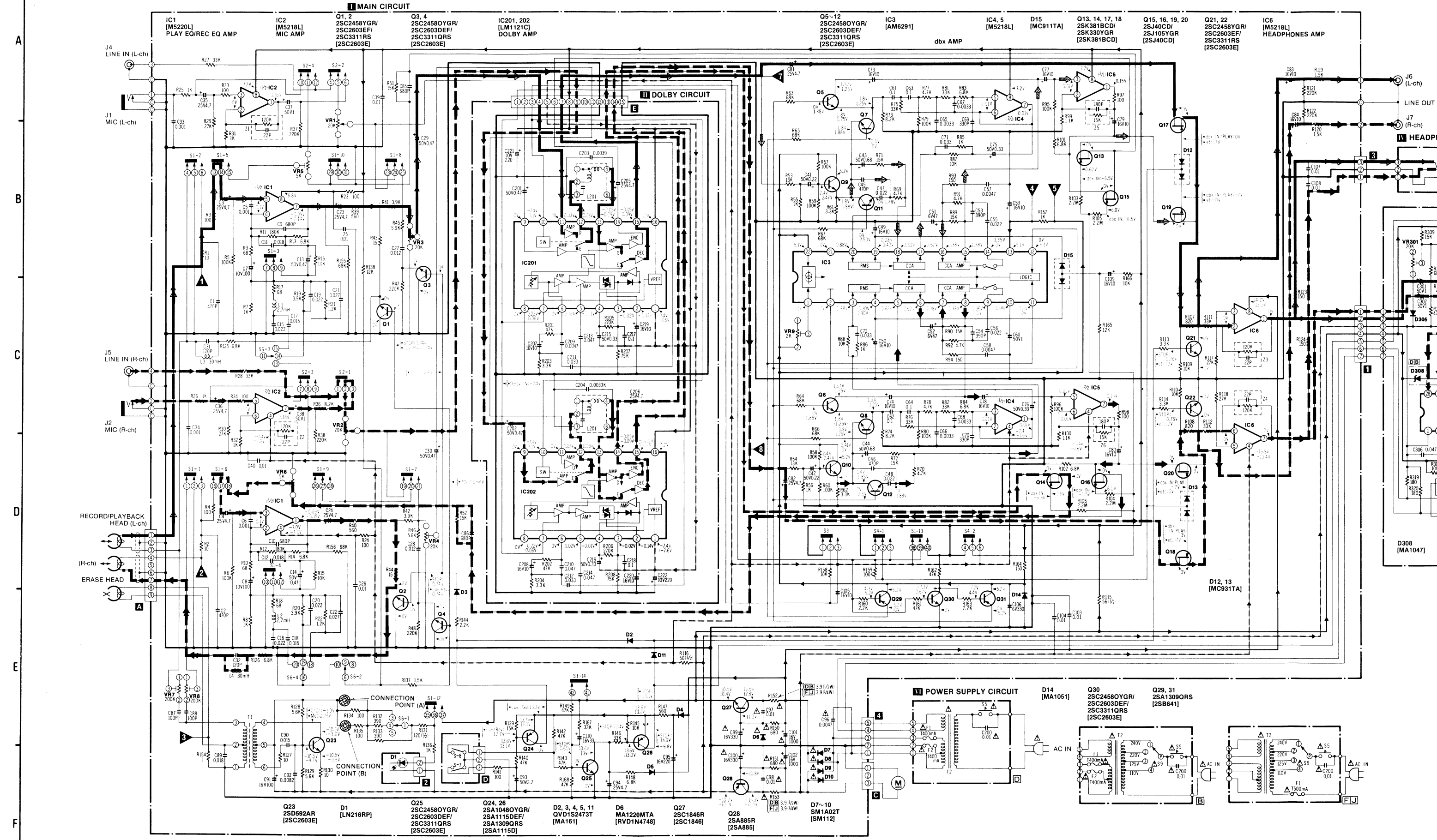


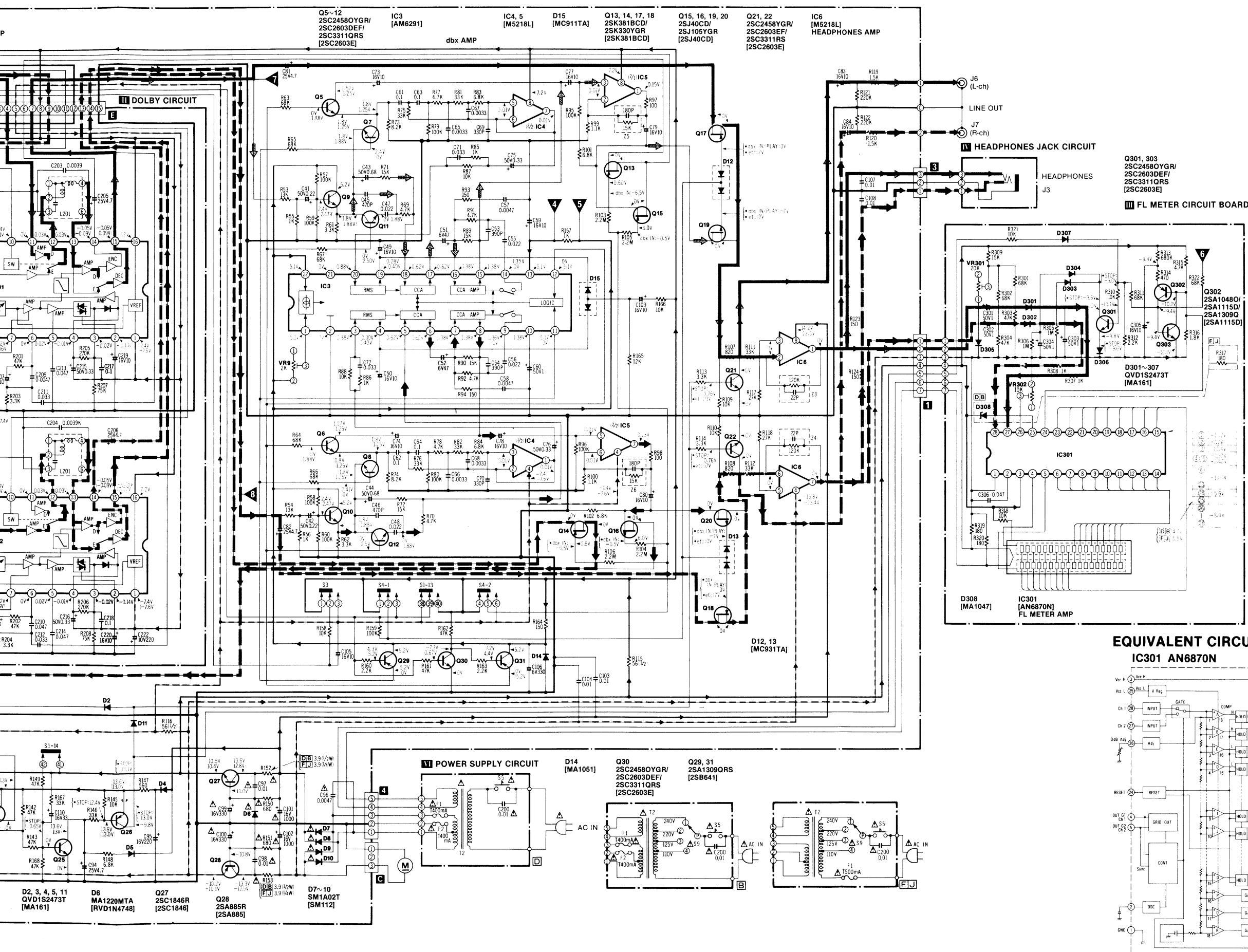
Fig. 24

BLOCK DIAGRAM (for L-CH only)



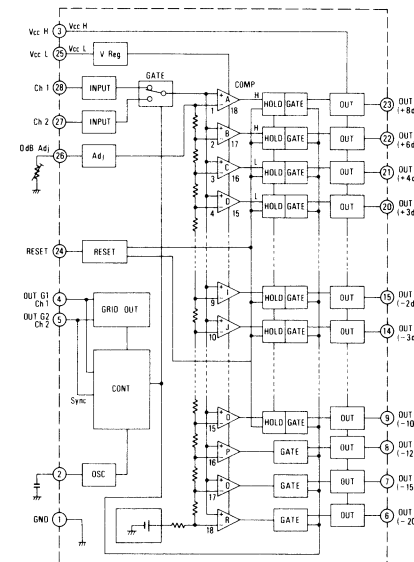
SCHEMATIC DIAGRAM





- NOTES:**
- S1Record/playback select switch (shown in playback position).
 - S2Input (MIC/LINE) select switch (shown in LINE position).
 - S3Dolby NR switch (shown in OUT position).
 - S4dbx switch (shown in OUT position).
 - S5Power ON/OFF switch (shown in OFF position).
 - S6Tape select switch (shown in (2) position).
[(1): Normal, (2): CrO₂, (3): Metal]
 - S7Cue/review switch (shown in OFF position).
 - S8Playback switch (shown in OFF position).
 - S9AC Power voltage select switch.
 - VR1, 2Input level controls.
 - VR3, 4Playback gain adjustment VR.
 - VR5, 6Recording gain adjustment VR.
 - VR7, 8Bias current adjustment VR.
 - VR9Attack recovery time adjustment VR.
 - VR301FL meter adjustment VR ("0dB" indication).
 - VR302FL meter adjustment VR ("20dB" indication).
 - Connection points (A) and (B).....Erase current adjustment points.
 - Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000(Ω), 1M = 1,000k(Ω).
 - Capacity are in micro-farads (μF) unless specified otherwise.
 - The mark (▼) shows test point. e.g. ▼ = Test point 1.
 - Important safety notice
Components identified by ▲ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
 - All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position otherwise specified.
 - No markVoltage values at OUT (NR select switch) mode.
()Voltage values at record mode.
STOPVoltage values at stop mode.
CUE/REVVoltage values at cue or review mode.
CrO₂Voltage values at CrO₂ tape mode.
MetalVoltage values at metal tape mode.
70μSVoltage values at CrO₂ or metal tape mode.
Dolby INVoltage values at Dolby IN mode.
dbx IN/PLAYVoltage values at dbx IN and playback mode.
For measurement, use VTVM.
 - indicates B+ (bias).
■ indicates B- (bias).
→ indicates the flow of the playback signal. (NR out).
⇨ indicates the flow of the recording signal. (NR out).
⇩ indicates the flow of the playback signal. (dbx IN).
⇨ indicates the flow of the record signal. (dbx IN).
 - Described in the schematic diagram are two types of numbers; the supply parts numbers and production parts number for transistors and diodes.
One type of number is used for supply parts number and production parts number when they are identical.
e.g. Q1
2SC1844(E,F).....Production parts number
[2SC1844E].....Supply parts number
D212
1S2473T77.....Production parts number
[MA161].....Supply parts numbers
 - The supply parts number is described alone in the replacement parts list.

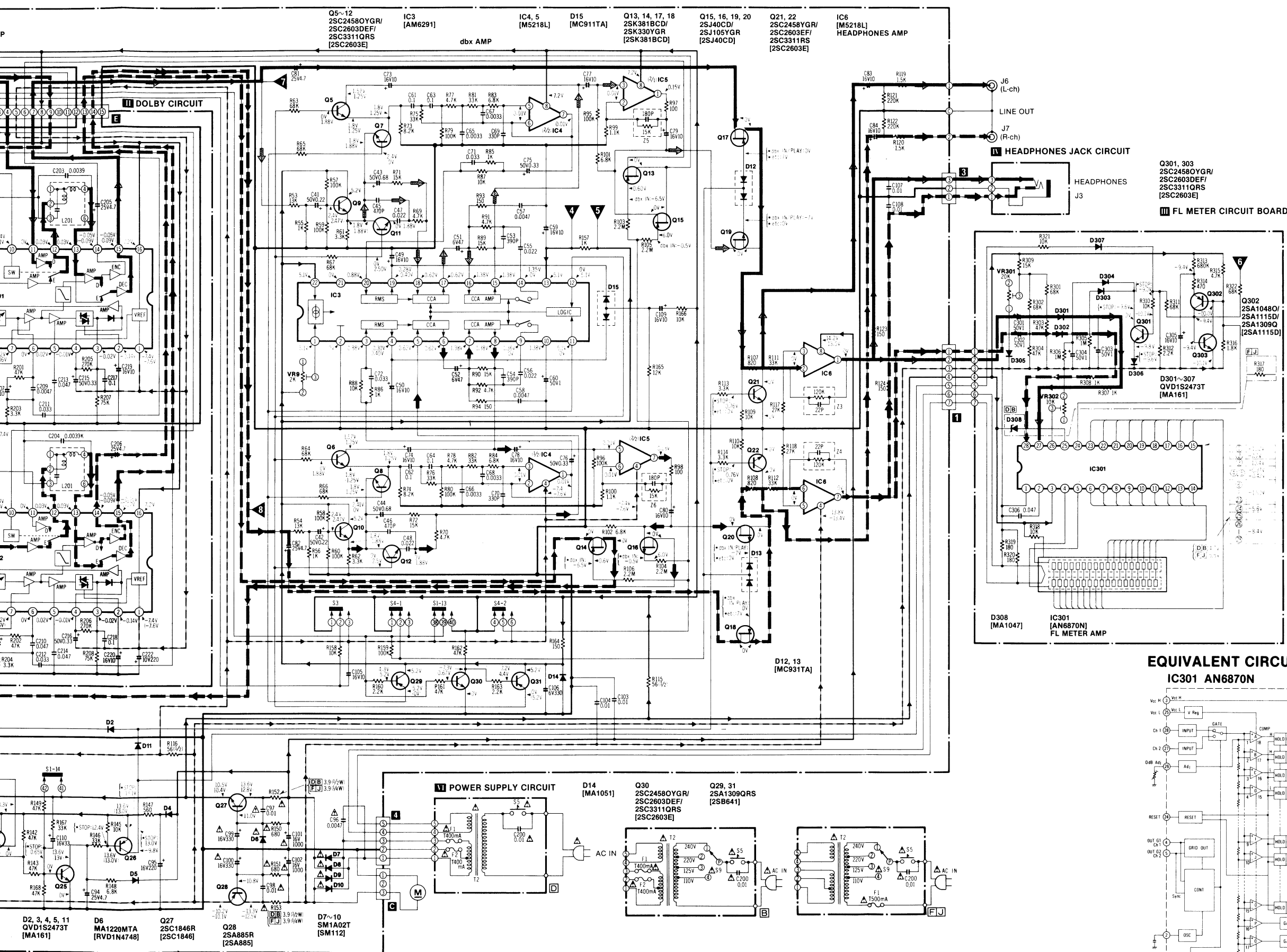
EQUIVALENT CIRCUIT
IC301 AN6870N



SPECIFICATIONS * Input level controls...MAX

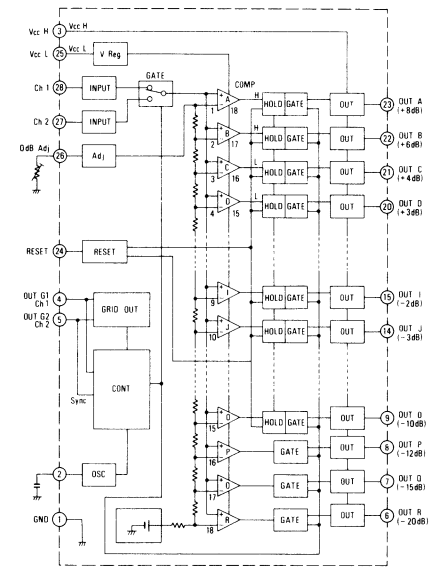
Playback S/N ratio * Test tape...QZZCFM	Greater than 45dB
Overall distortion * Test tape ...QZZCRA for Normal ...QZZCRX for CrO ₂ ...QZZCRZ for Metal	Less than 4%
Overall S/N ratio * Test tape...QZZCRA	Greater than 43dB (without NAB filter)

- NOTES:**
-For all European areas except United Kingdom.
 -For United Kingdom.
 - FFor Asian PX.
 - JFor European PX.



- NOTES:**
- S1Record/playback select switch (shown in playback position).
 - S2Input (MIC/LINE) select switch (shown in LINE position).
 - S3Dolby NR switch (shown in OUT position).
 - S4dbx switch (shown in OUT position).
 - S5Power ON/OFF switch (shown in OFF position).
 - S6Tape select switch (shown in (2) position).
[(1): Normal, (2): CrO₂, (3): Metal]
 - S7Cue/review switch (shown in OFF position).
 - S8Playback switch (shown in OFF position).
 - S9AC Power voltage select switch.
 - VR1, 2Input level controls.
 - VR3, 4Playback gain adjustment VR.
 - VR5, 6Recording gain adjustment VR.
 - VR7, 8Bias current adjustment VR.
 - VR9Attack recovery time adjustment VR.
 - VR301FL meter adjustment VR ("0dB" indication).
 - VR302FL meter adjustment VR ("20dB" indication).
 - Connection points (A) and (B).....Erase current adjustment points.
 - Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000(Ω), 1M = 1,000k(Ω).
 - Capacity are in micro-farads (μF) unless specified otherwise.
 - The mark (▼) shows test point. e.g. ▼ = Test point 1.
 - Important safety notice
Components identified by ▲ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
 - All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position otherwise specified.
No markVoltage values at OUT (NR select switch) mode.
()Voltage values at record mode.
STOPVoltage values at stop mode.
CUE/REVVoltage values at cue or review mode.
CrO₂Voltage values at CrO₂ tape mode.
MetalVoltage values at metal tape mode.
70μSVoltage values at CrO₂ or metal tape mode.
Dolby INVoltage values at Dolby IN mode.
dbx IN/PLAYVoltage values at dbx IN and playback mode.
For measurement, use VTVM.
 - indicates B+ (bias).
■ indicates B- (bias).
▶ indicates the flow of the playback signal. (NR out).
◀ indicates the flow of the recording signal. (NR out).
◀ indicates the flow of the playback signal. (dbx IN).
▶ indicates the flow of the record signal. (dbx IN).
 - Described in the schematic diagram are two types of numbers; the supply parts numbers and production parts number for transistors and diodes.
One type of number is used for supply parts number and production parts number when they are identical.
e.g. Q1
2SC1844(E,F).....Production parts number
[2SC1844E].....Supply parts number
D212
1S2473T77.....Production parts number
[MA161].....Supply parts numbers
 - The supply parts number is described alone in the replacement parts list.
 - This schematic diagram may be modified at any time with the development of new technology.

EQUIVALENT CIRCUIT
IC301 AN6870N



SPECIFICATIONS * Input level controls...MAX	
Playback S/N ratio * Test tape...QZZCFM	Greater than 45dB
Overall distortion * Test tape ...QZZCRA for Normal ...QZZCRX for CrO ₂ ...QZZCRZ for Metal	Less than 4%
Overall S/N ratio * Test tape...QZZCRA	Greater than 43dB (without NAB filter)

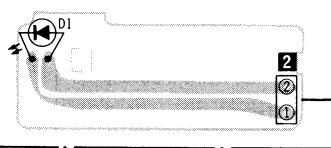
- NOTES:**
-For all European areas except United Kingdom.
 -For United Kingdom.
 - FFor Asian PX.
 - JFor European PX.

3

— 16 —

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

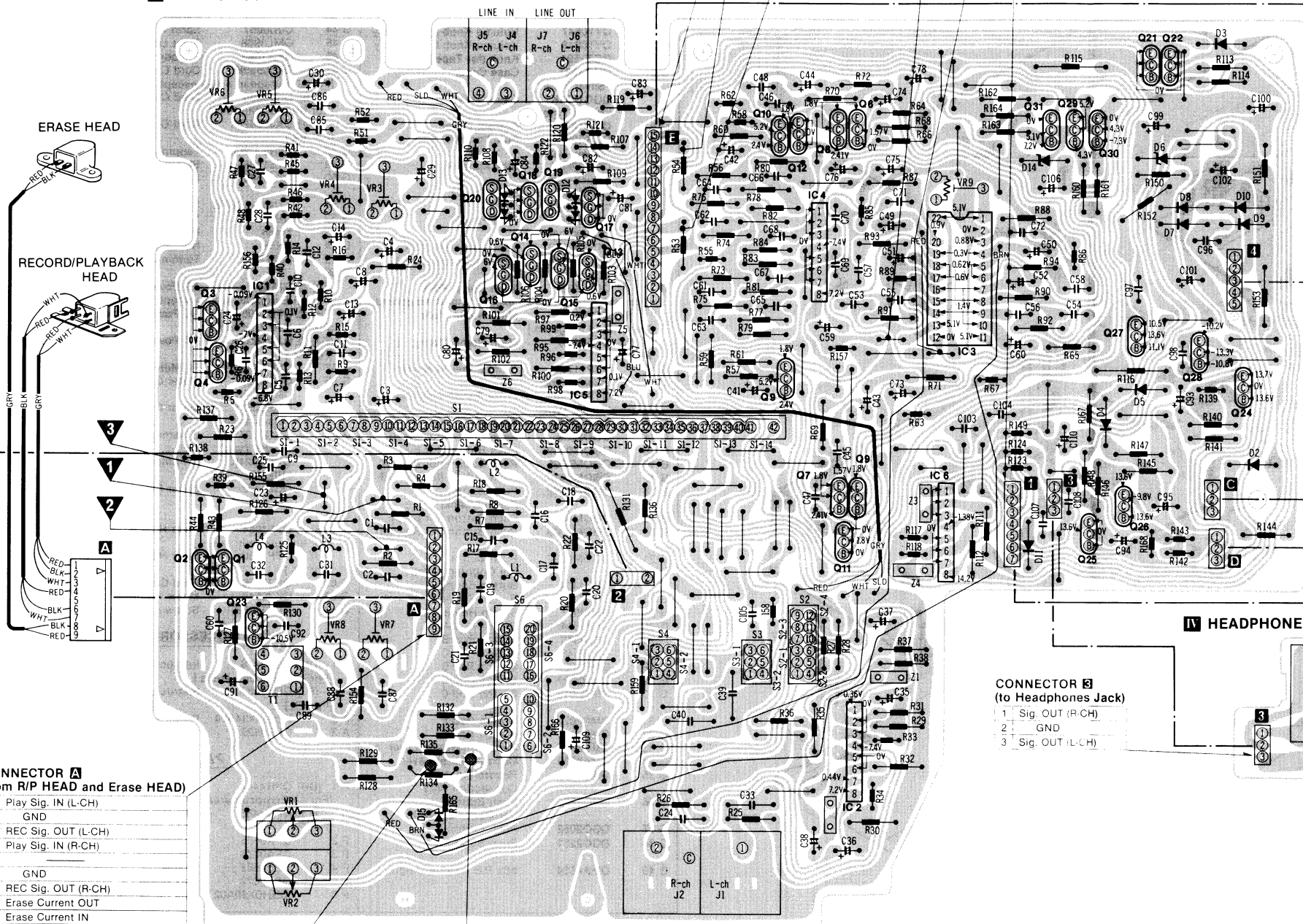
I LED CIRCUIT BOARD



CONNECTOR E (to Dolby Circuit)

1 NR Change Sig. OUT	9 Encode Sig. OUT (R-CH)
2 Encode Sig. OUT (L-CH)	10 Decode Sig. OUT (R-CH)
3 Encode/Decode Change Sig. OUT	11 Decode Sig. OUT (L-CH)
4 Decode Sig. OUT (L-CH)	12 GND
5 B+ (bias) OUT	13 Encode Sig. IN (R-CH)
6 Encode Sig. IN (L-CH)	14 Encode/Decode Sig. IN (R-CH)
7 Encode/Decode Sig. IN (L-CH)	15 GND
8 B+ (bias) OUT	

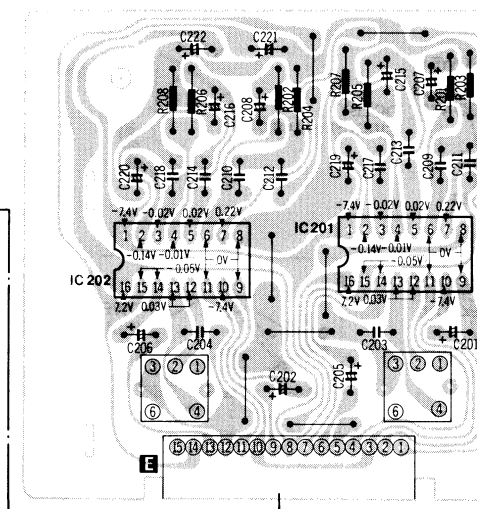
II MAIN CIRCUIT BOARD



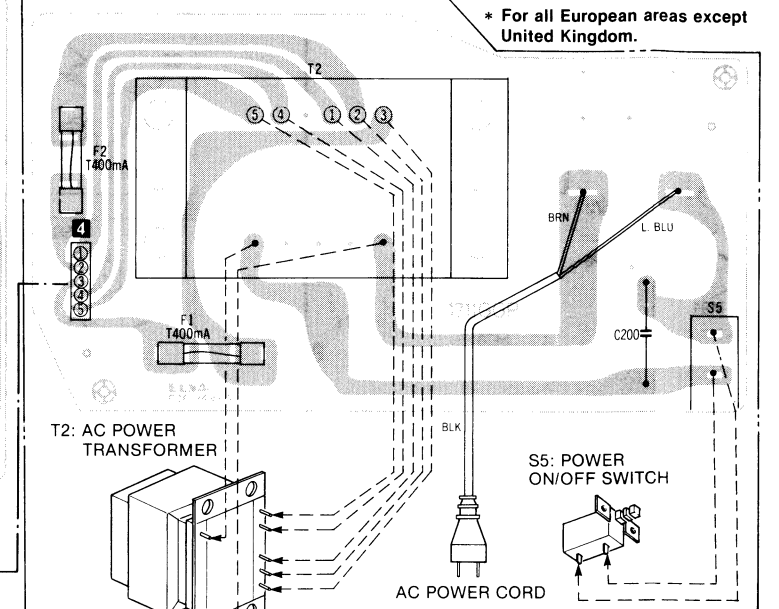
CONNECTOR I (to FL Meter Circuit)

1 Sig. OUT (R-CH)
2 Sig. OUT (L-CH)
3 GND
4 B+ (bias)
5 Muting. Sig. OUT
6 AC Voltage

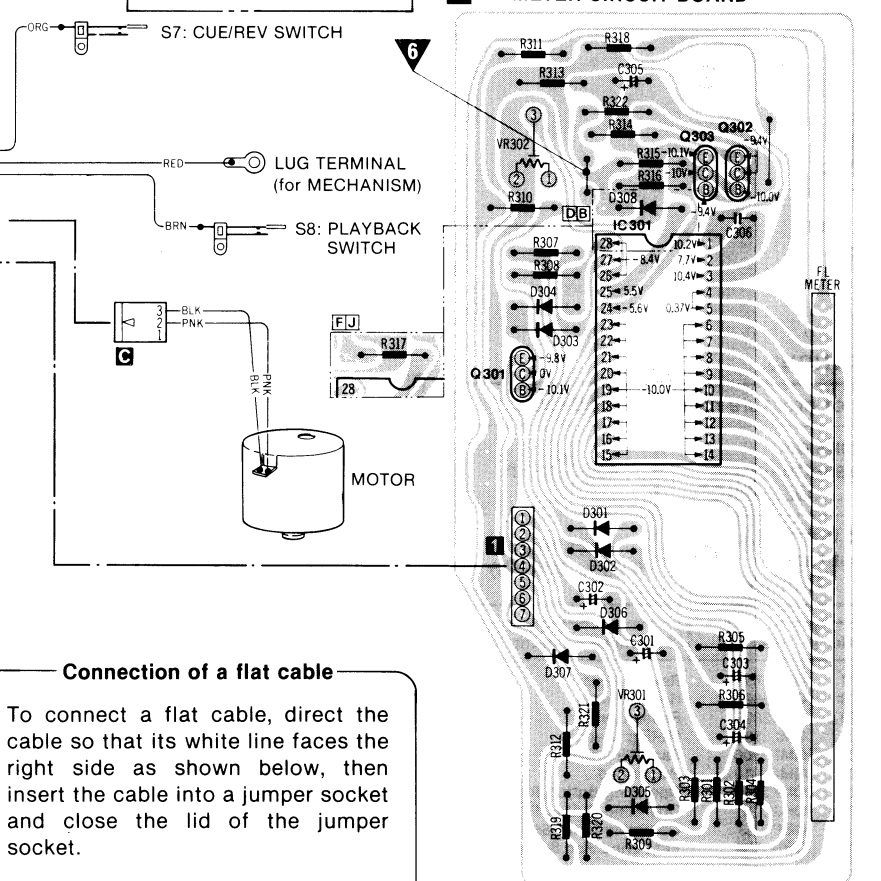
III DOLBY CIRCUIT BOARD



IV POWER SUPPLY CIRCUIT BOARD



V FL METER CIRCUIT BOARD



VI HEADPHONE JACK CIRCUIT BOARD

CONNECTOR E (to Headphones Jack)

1 Sig. OUT (R-CH)
2 GND
3 Sig. OUT (L-CH)

NOTES:

BLKBlack
BLUBlue
BRNBrown
GRYGray
GRNGreen
L. BLULight Blue
NILNo Color Mark
ORGOrange
PNKPink
REDRed
SLDShield Wire
VLTViolet
WHTWhite
YELYellow

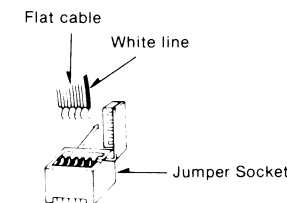
NOTES:

- The circuit shown in [] on the conductor side indicates printed circuit on the back side of the printed circuit board.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position.

- This circuit board diagram may be modified at any time with the development of new technology.

Connection of a flat cable

To connect a flat cable, direct the cable so that its white line faces the right side as shown below, then insert the cable into a jumper socket and close the lid of the jumper socket.

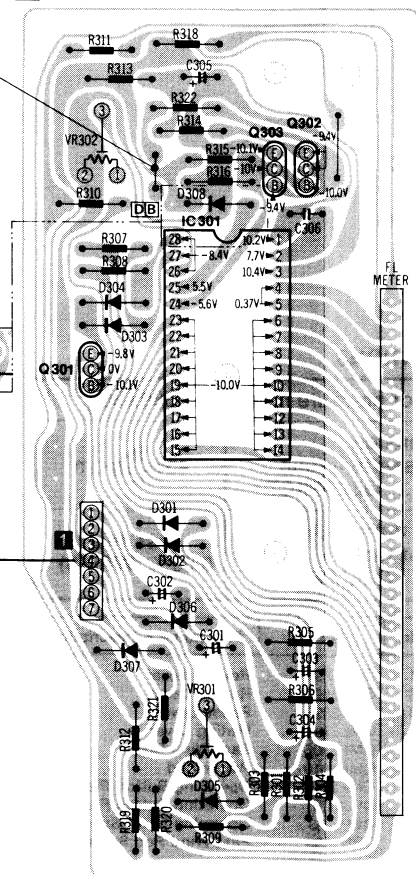
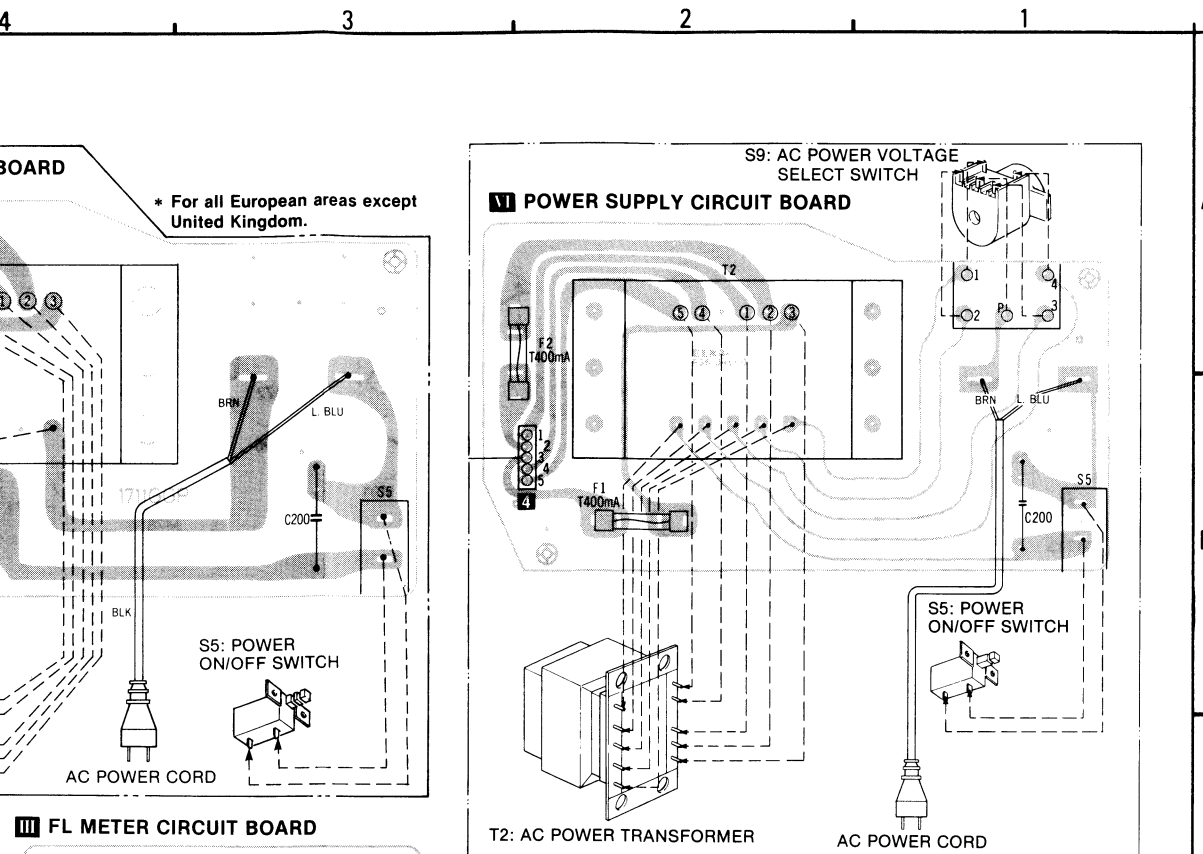


NOTES:

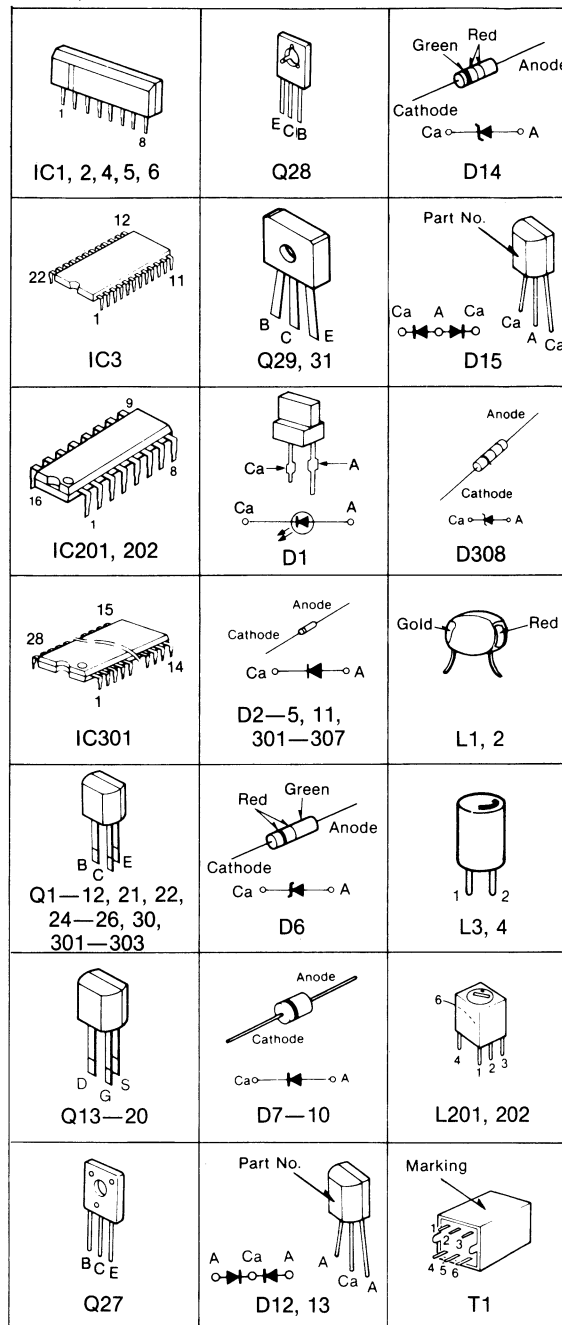
- []For all European areas except United Kingdom.
- []For United Kingdom.
- []For Asian PX.
- []For European PX.

CONNECTION POINT (A)

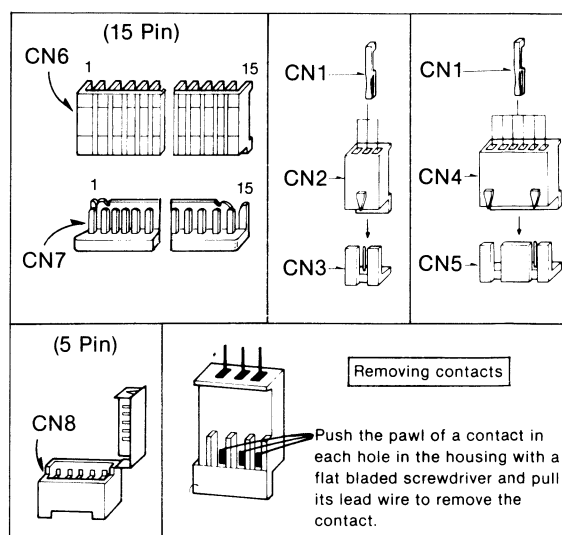
CONNECTION POINT (B)



TERMINATIONS



CONNECTORS



ELECTRICAL PARTS LIST

NOTES: RESISTORS

ERD... Carbon
ERG... Metal-oxide
ERS... Metal-oxide
ERO... Metal-film
ERX... Metal-film
ERQ... Fuse type metallic
ERC... Solid
ERF... Cement

CAPACITORS

ECBA... Ceramic
ECG... Ceramic
ECK... Ceramic
ECC... Ceramic
ECF... Ceramic
ECQM... Polyester film
ECQE... Polyester film
ECQF... Polypropylene
ECE... Electrolytic
ECEN... Non polar electrolytic
EQS... Polystyrene
EQS... Tantalum
QCS... Tantalum

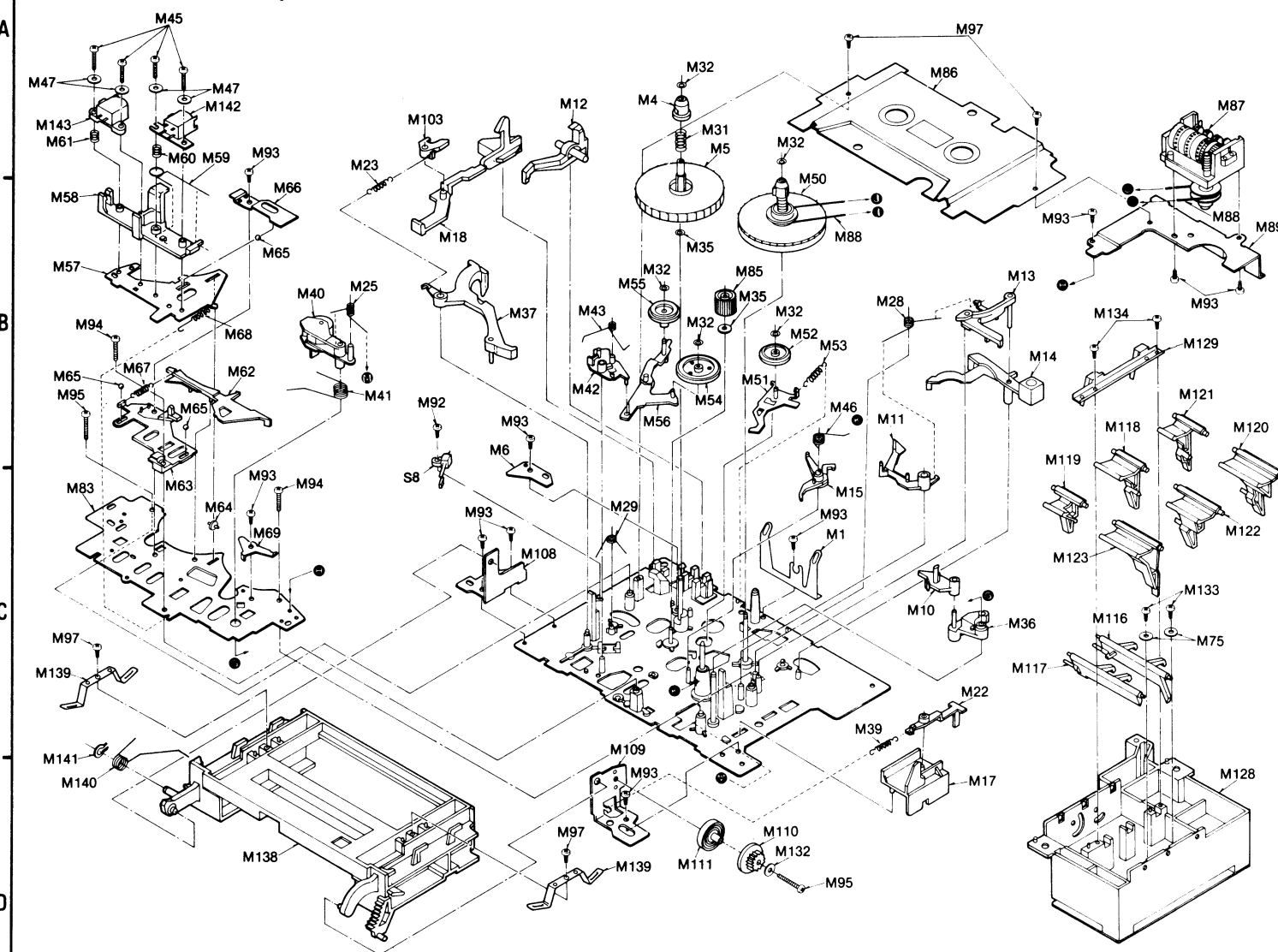
REPLACEMENT PARTS LIST

Important safety notice
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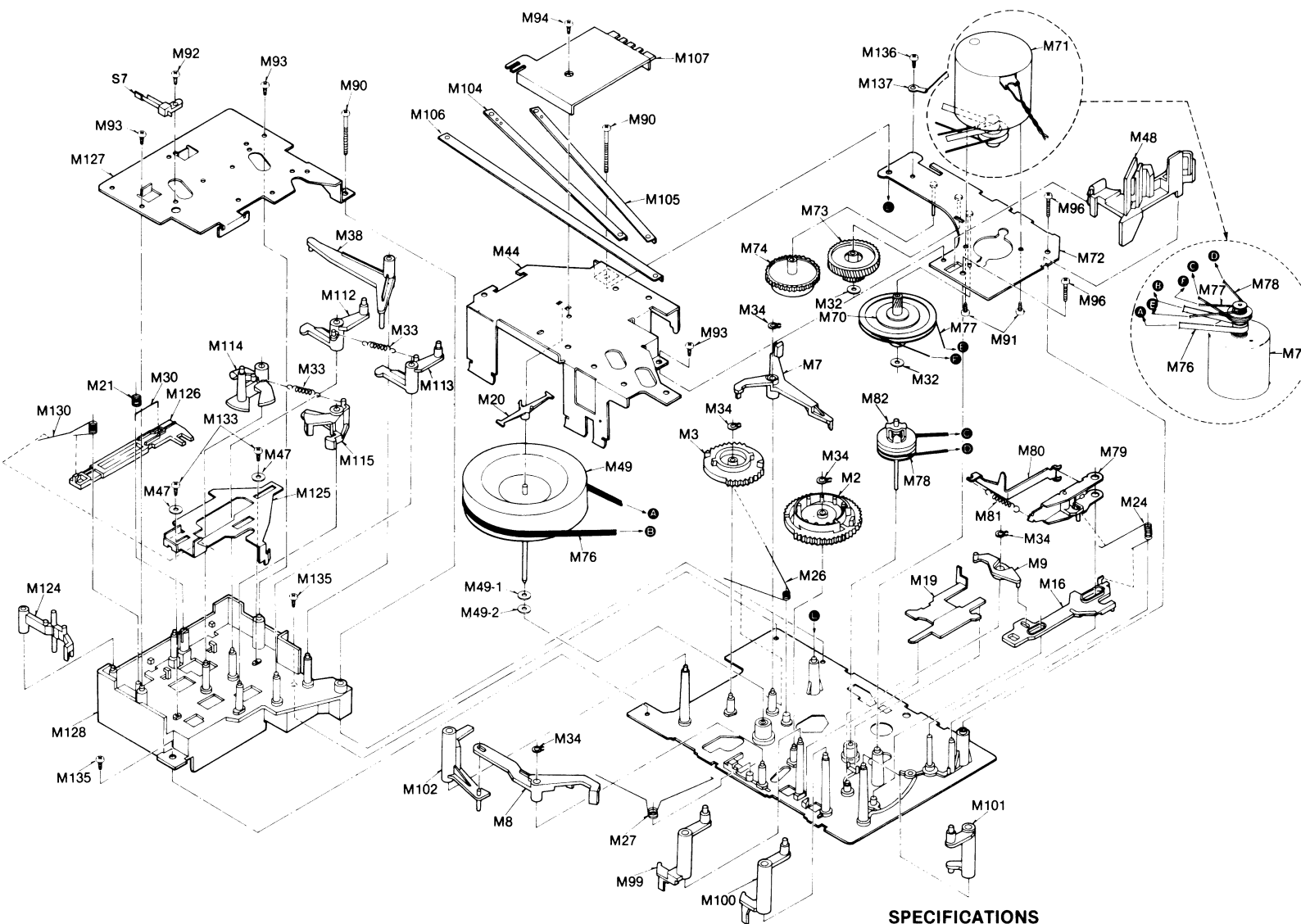
Ref No.	Part No.	Ref No.	Part No.	Ref No.	Part No.	Ref No.	Part No.		
RESISTORS				DIODES & RECTIFIERS					
R 1, 2	ERD25FJ100	R 146	ERD25TJ333	C 49, 50	ECEA16Z10	Q 301	2SC2603E		
R 3, 4	ERD25FJ101	R 147	ERD25FJ561	C 51, 52	ECEA1AS470	Q 302	2SA1115D		
R 5, 6	ERD25TJ104	R 148	ERD25FJ682	C 53, 54	ECCD1H391J	Q 303	2SC2603E		
R 7, 8	ERD25FJ102	R 149	ERD25TJ473	C 55, 56	ECQM1H223JZ	INTEGRATED CIRCUITS			
R 9, 10	ERD25FJ680	R 150, 151	ERD25FJ681	C 57, 58	ECQM1H472JZ				
R 11, 12	ERD25TJ184	R 152, 153	ERD25FJ681	C 59	ECEA1HS100				
R 13, 14	ERD25FJ682	[DB] ERX12ANJ3R9	[For all European areas.]	C 60	ECEA50Z1				
R 15, 16	ERD25FJ103	[FJ] ERD25FJ3R9	[For PX.]	C 61, 62, 63, 64	ECQM1H104JZ	IC 1 M5220L IC 2 M5218L IC 3 AN6291 IC 4, 5, 6 M5218L IC 201, 202 LM1121C IC 301 AN6870N			
R 17, 18	ERD25FJ680	R 154	ERD25FJ1R0	C 65, 66, 67, 68	ECQM1H332JZ				
R 19, 20	ERD25FJ392	R 155, 156	ERD25TJ683	C 69, 70	ECCD1H331J				
R 21, 22	ERD25FJ122	R 157	ERD25FJ102	C 71, 72	ECQM1H333JZ				
R 23, 24	ERD25FJ101	R 158	ERD25FJ103	C 73, 74	ECEA1HS100	F 1 [DB] XBAQ0007 Fuse (T400mA) [For all European areas.] [FJ] XBA2E03NS5 Fuse (T500mA) [For PX.] F 2 [DB] XBAQ0007 Fuse (T400mA) [For all European areas.]			
R 25, 26	ERD25FJ102	R 159	ERD25TJ104	C 75, 76	ECEA50ZR33				
R 27, 28	ERD25TJ333	R 160	ERD25FJ222	C 77, 78, 79, 80	ECEA1HS100				
R 29, 30	ERD25TJ273	R 161, 162	ERD25TJ473	C 81, 82	ECEA25Z4R7				
R 31, 32	ERD25FJ102	R 163	ERD25FJ222	C 83, 84	ECEA1HS100	L 1, 2 QLQX2722D Peaking Coil L 3, 4 QLQX0343KWA Bias Trap Coil L 201, 202 QLM9Z9K MPX Coil			
R 33, 34	ERD25FJ101	R 164	ERD25FJ151	C 85, 86	ECKD1H681KB				
R 35, 36	ERD25FJ822	R 165	ERD25TJ123	C 87, 88	ECCD1H101K				
R 37, 38	ERD25TJ224	R 166	ERD25FJ103	C 89	ECQP1H83JZ				
R 39, 40	ERD25FJ561	R 167	ERD25TJ333	C 90	ECQM1H153JZ	COILS			
R 41, 42	ERD25FJ392	R 168	ERD25TJ473	C 91	ECEA1ES101				
R 43, 44	ERD25FJ150	R 201, 202	ERD25TJ473	C 92	ECQM1H822JZ				
R 45, 46	ERD25FJ562	R 203, 204	ERD25FJ332	C 93	ECEA50Z2R2				
R 47, 48	ERD25TJ224	R 205, 206	ERD25TJ274	C 94	ECEA25Z4R7	TRANSFORMERS			
R 51, 52	ERD25TJ153	R 207, 208	ERD25TJ753	C 95	ECEA1CS221				
R 53, 54	ERD25TJ133	R 301, 302	ERD25TJ683	C 96	ECKD2H472PEL				
R 55, 56	ERD25FJ102	R 303, 304	ERD25TJ473	C 97, 98	ECKD1H103ZF				
R 57, 58, 59, 60	ERD25TJ104	R 305, 306	ERD25TJ105	C 99, 100	ECEA1CS331	T 1 QLB0198 Bias Oscillation Transformer T 2 [D] ALPDP68EKC AC Power Transformer [For all European areas except United Kingdom.] [B] QLPA72EKC AC Power Transformer [For United Kingdom.] [FJ] ALQPN73EKC AC Power Transformer [For PX.]			
R 61, 62	ERD25FJ332	R 307, 308	ERD25FJ102	C 101, 102	ECEA1CS102				
R 63, 64	ERD25TJ683	R 309	ERD25TJ153	C 103, 104	ECKD1H103ZF				
R 65, 66	ERD25TJ223	R 310	ERD25FJ103	C 105	ECEA1CN100				
R 67, 68	ERD25TJ683	R 311	ERD25TJ683	C 106	ECEA1AS331	SWITCHES			
R 69, 70	ERD25FJ472	R 312	ERD25FJ222	C 107, 108	ECKD1H103ZF				
R 71, 72	ERD25TJ153	R 313	ERD25TJ684	C 109	ECEA1HS100				
R 73, 74	ERD25FJ822	R 314	ERD25FJ471	C 110	ECEA1CS330				
R 75, 76	ERD25TJ333	R 315	ERD25FJ472	C 200	ECQU2A103MF	S 1 QSSE203 Slide Switch (for Record/Playback Change) S 2, 3, 4 QSWX416 Combination Switch (Input Selector, Dolby NR, dbx NR) S 5 ESB822S Push Switch (Power ON/OFF) S 6 QSR4306 Rotary Switch (Tape Selector) S 7 QSB0251 Leaf Switch S 8 QSB0251 (Cue/Review SW) S 9 QSB0251 Leaf Switch (Play SW) [BFJ] QSR1410 AC Power Voltage Select Switch [For United Kingdom and PX.]			
R 77, 78	ERD25FJ472	R 316	ERD25FJ182	C 201, 202	ECEA50ZR47				
R 79, 80	ERD25TJ104	R 317 [FJ]	ERD25FJ181	C 203, 204	ECFDD392KVY				
R 81, 82	ERD25TJ333	R 318	ERD25FJ103	C 205, 206	ECEA25Z4R7				
R 83, 84	ERD25FJ682	R 319, 320	ERD25FJ181	C 207, 208	ECEA1HS100	JACKS			
R 85, 86	ERD25FJ102	R 321	ERD25FJ103	C 209, 210	ECQM1H472JZ				
R 87, 88	ERD25FJ103	R 322	ERD25TJ683	C 211, 212	ECQM1H333JZ				
R 89, 90	ERD25TJ153	VARIABLE RESISTORS							
R 91, 92	ERD25FJ472	VR 1, 2	EWJS3AF22A24	C 213, 214	ECQM1H473JZ	CONNECTORS			
R 93, 94	ERD25FJ151	VR 3, 4	ENVNM4AA00B24	C 215, 216	ECEA50ZR33				
R 95, 96	ERD25TJ104	VR 5, 6	ENVNM4AA00B53	C 217, 218	ECQM1H104JZ				
R 97, 98	ERD25FJ101	VR 7, 8	ENVNM4AA00B25	C 219, 220	ECEA1HS100				
R 99, 100	ERD25FJ112	VR 9	ENVNM4AA00B23	C 221, 222	ECEA1AS221	J 1, 2 QJA0451 Microphone Jack J 3, 4 QJA0259 Jack (for Headphones) J 4, 5, 6, 7 QJ5028S Jack Board (for LINE IN/OUT)			
R 101, 102	ERD25FJ682	VR 301	ENVNM4AA00B24	C 301, 302, 303, 304	ECEA50Z1				
R 103, 104, 105, 106	ERD25TJ225	VR 302	ENVNM4AA00B14	C 305	ECEA1HS100				
R 107, 108	ERD25FJ821	CAPACITORS							
R 109, 110	ERD25FJ103	C 1, 2	ECKD1H471KB	C 306	ECFDD473KXY	SPARK KILLERS			
R 111, 112	ERD25TJ333	C 3, 4	ECEA25Z4R7	Z 1, 2, 3, 4 EXRP220K124 Z 5, 6 EXRP181K153					
R 113, 114	ERD25FJ332	C 5, 6	ECKD1H102KB						
R 115, 116	ERD50FJ560	C 7, 8	ECEA1AS101						
R 117, 118	ERD25TJ273	C 9, 10	ECKD1H681KB						
R 119, 120	ERD25FJ152	C 11, 12	ECQM1H183JZ	TRANSISTORS					
R 121, 122	ERD25TJ224	C 13, 14	ECEA50ZR47						
R 123, 124	ERD25FJ151	C 15, 16	ECQM1H223JZ						
R 125, 126	ERD25FJ682	C 17, 18	ECQM1H153JZ						
R 127	ERD25FJ100	C 19, 20	ECFDD223KXY	Q 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 12 2SC2603E					
R 128, 129	ERD25FJ562	C 21, 22	ECFDD273KXY						
R 130	ERD25FJ100	C 23, 24	ECEA25Z4R7						
R 131	ERD50FJ121	C 25, 26	ECKD1H103ZF						
R 132, 133	ERD25FJ391	C 27, 28	ECFDD123KVY	Q 13, 14 2SK381BCD Q 15, 16 2SJ40CD Q 17, 18 2SK381BCD Q 19, 20 2SJ40CD Q 21, 22 2SC2603E Q 23 2SD592 Q 24 2SC2603E Q 25 2SA1115D					
R 134, 135	ERD25FJ101	C 29, 30	ECEA50ZR47						
R 136	ERD25FJ102	C 31, 32	ECKD2H121KBL						
R 137	ERD25FJ152	C 33, 34	ECBS1H102KBY						
R 138	ERD25TJ123	C 35, 36	ECEA25Z4R7	Q 26 2SA1115D Q 27 2SC1846 Q 28 2SA885 Q 29 2SB641 Q 30 2SC2603E Q 31 2SB641					
R 139	ERD25TJ153	C 37, 38	ECEA50Z1						
R 140	ERD25TJ473	C 39, 40	ECBS1C103NYY						
R 141	ERD25FJ101	C 41, 42	ECEA50ZR22						
R 142, 143	ERD25TJ473	C 43, 44	ECEA50ZR68	Q 29 2SB641 Q 30 2SC2603E Q 31 2SB641					
R 144	ERD25FJ222	C 45, 46	ECCD1H471J						
R 145	ERD25FJ103	C 47, 48	ECQM1H223JZ						

MECHANICAL PARTS LOCATION

(FRONT VIEW)



(REAR VIEW)



When servicing this mechanism unit, refer to the disassembly notes and assembly instructions described in the service manuals of RS-M51, RS-M13, RS-M14 and RS-M04 (RS-M24 mechanism series).

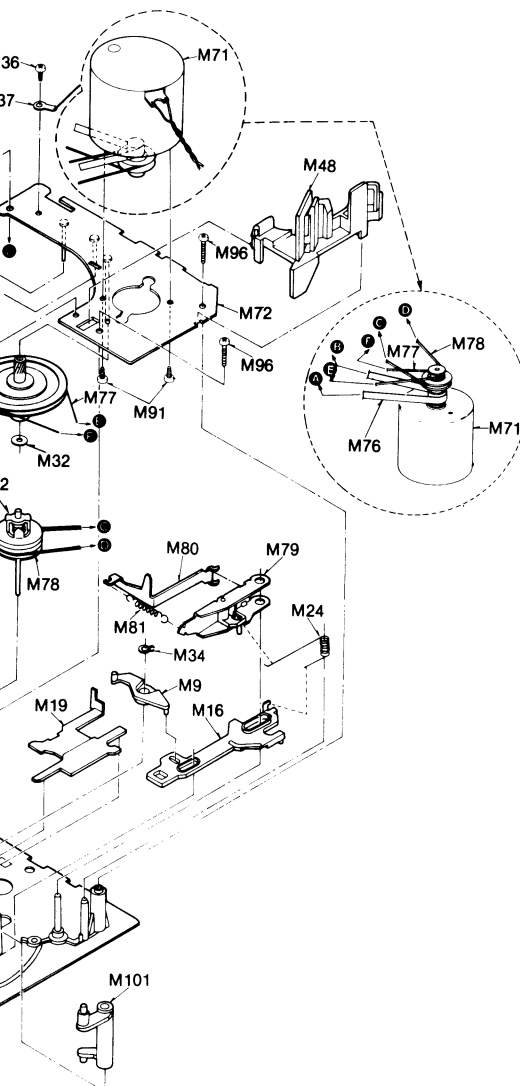
SPECIFICATIONS

Pressure of pressure roller	350±50g
Takeup tension * Use cassette torque meter.....QZZSRKCT	45± ¹⁵ / ₁₅ g-cm
Wow and flutter; (JIS) * Use test tapeQZZCWAT	Less than 0.08% (WRMS)

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
MECHANICAL PARTS			M 20	QZM1283	Flywheel Thrust Retainer	M 40	QXL1381	Pressure Roller Assembly	M 57	QMK1840	Head Base Plate	M 79	QXL1360	Record/Playback Selection Arm Assembly	M 100	QML3886	Rewind Driving Lever
M 1	QBP1874	Cassette Pressure Spring	M 21	QBC1357	Lock Pin Pressure Spring	M 41	QBN1743	Pressure Roller Spring	M 58	QMK1241	Head Spacer	M 80	QML3580	Record/Playback Selection Lever	M 101	QML3887	Record Driving Lever
M 2	QDG1201	Main Gear	M 22	QML3896	Auto-Stop Selection Lever	M 42	QML3588	Fast Forward Lever	M 59	QBN1740	Head Pressure Spring	M 81	QBT1895	Record/Playback Selection Lever	M 102	QML3897	Play Changing Lever
M 3	QDG1202	Sub Gear	M 23	QBT1962	Main Lever Spring	M 43	QBN1748	Fast Forward Spring	M 60	QBC1278	Head Spring	M 82	QXP0607	Record/Playback Selection Lever Spring	M 103	QML3901	Eject Obstruction Lever
M 4	QMB1336	Supply Reel Table Hub	M 24	QBN1739	Selection Lever Spring	M 44	QMA4410	Flywheel Retainer	M 61	QBCA0008	Head Spring	M 83	QXN0607	Fast Forward Connection Plate	M 104	QMR2007	Fast Forward Connection Plate
M 5	QDR1139	Supply Reel Table	M 25	QBN1742	Pressure Roller Release Spring	M 45	XSN2 + 10	Screw 2x10	M 62	QML3591	Brake Arm	M 84	QXN0607	Rewind Connection Plate	M 105	QMR2008	Rewind Connection Plate
M 6	QMF2118	Fast Forward Arm Bracket	M 26	QBN1744	Sub Gear Spring	M 46	QBN1741	Change Lever Spring	M 63	QMN2240	Sub Head Base Plate	M 85	QDP1828	Record Connection Plate	M 106	QMR2009	Record Connection Plate
M 7	QML3899	Sub Control Lever	M 27	QBN1897	Main Gear Spring	M 47	XWG2B	Washer 2φ	M 64	QMN2550	Roller	M 86	QXN0408	Connection Plate Retainer	M 107	QZM1288	Connection Plate Retainer
M 8	QML3898	Main Control Lever	M 28	QBN1746	Auto-Stop Lever Spring	M 48	QZM1254	Cord Clamper	M 65	QDK1017	Steel Ball 2φ	M 87	QXN0408	Holding Angle-L	M 108	QMA4411	Holding Angle-L
M 9	QML3900	Record Operation Lever	M 29	QBN1747	Connection Spring	M 49	QXF0199	Flywheel Assembly	M 66	QBP1873	Head Base Plate Pressure Spring	M 88	QDB0169	Holding Angle-R	M 109	QMA4412	Holding Angle-R
M 10	QML3586	Head Base Plate Lift Lever	M 30	QBS1137	Pause Lock Pin	M 49-1	QBW2049	Poly Washer	M 67	QBT1597	Brake Arm Spring	M 89	QMA4439	Damper Gear	M 110	QDG1254	Damper Gear
M 11	QML3594	Auto-Stop Release Arm	M 31	QBC1372	Reel Table Spring	M 49-2	QBW2026	Snap Ring	M 68	QBT1892	Head Release Spring	M 90	XTN3 + 24B	Taping Screw 3x24	M 111	QDP1920	Damper Retainer
M 12	QML3603	Erase Safety Lever	M 32	QBW2008	Poly Washer	M 50	QXD1143	Takeup Reel Table Assembly	M 69	QMA3858	Head Adjustment Plate	M 91	XSN26 + 3	Screw 2.6x3	M 112	QML3878	Fast Forward Change Lever
M 13	QML3604	Auto-Stop Driving Lever	M 33	QBT1961	Operating Change Lever Spring	M 51	QXL1382	Idle Lever Assembly	M 70	QZK0241	Takeup Gear Assembly	M 92	XTN2 + 6B	Taping Screw 2x6	M 113	QML3879	Rewind Change Lever
M 14	QML3605	Auto-Stop Detection Lever	M 34	XUB3FT	Stop Ring 3φ	M 52	QX10111	Takeup Idler Assembly	M 71	QXU0297	Motor Assembly	M 93	XTN26 + 6B	Taping Screw 2.6x6	M 114	QML3880	Record Change Lever
M 15	QML3592	Change Lever	M 35	QBW2012	Poly Washer	M 53	QBT1893	Takeup Idler Spring	M 72	QXK2286	Sub Chassis Assembly	M 94	XTN26 + 10B	Taping Screw 2.6x10	M 115	QML3881	Play Change Lever
M 16	QMR2013	Record Rod	M 36	QXL1354	Sub Lever Assembly	M 54	QX10113	Fast Forward Idler Assembly	M 73	QDG1199	Auto-Stop Gear	M 95	XTN26 + 12B	Taping Screw 2.6x12	M 116	QML3883	Lock Arm-A
M 17	QMR2011	Record-Stop Connection Rod	M 37	QXL1355	Main Lever Assembly	M 55	QX10112	Rewind Idler Assembly	M 74	QDG1200	Cam Gear	M 96	XTN3 + 10B	Taping Screw 3x10	M 117	QML3884	Lock Arm-B
M 18	QMR2014	Eject Rod	M 38	QML3882	Pause Change Lever	M 56	QXL1383	Fast Forward Arm Assembly	M 75	XWG2	Washer 2 φ	M 97	XTN26 + 5BFZ	Taping Screw 2.6x5	M 118	QML3888	Play Lever
M 19	QMR2012	Control Rod	M 39	QBT1682	Lock Retainer Spring				M 76	QDB0324	Capstan Belt	M 99	QML3885	Fast Forward Driving Lever	M 119	QML3889	Stop lever
									M 77	QDB0274	Takeup Belt				M 120	QML3890	Fast Forward Lever
									M 78	QDB0273	Fast Forward Belt						

CABINET PARTS LOCATION



SPECIFICATIONS	
Pressure of pressure roller	350±50g
Takeup tension * Use cassette torque meter.....QZZSRKCT	45±15g-cm
Wow and flutter; (JIS) * Use test tapeQZZCWAT	Less than 0.08% (WRMS)

Ref. No.	Part No.	Part Name & Description
M 121	QML3891	Rewind Lever
M 122	QML3892	Record Lever
M 123	QML3893	Pause Lever
M 124	QML3894	Muting Lever
M 125	QMR2006	Fast Wind Rod
M 126	QMR2010	Pause Rod
M 127	QMF2245	Operating Button Plate
M 128	QKJ0537	Operating Button Frame
M 129	QBP1953	Operating Lever Spring
M 130	QBN1898	Fast Wind Rod Spring
M 131	QBW2020	Washer 2.6φ
M 132	XWG26	Washer 2.6φ
M 133	XTN2+5B	Tapping Screw 2x5
M 134	XTN2+4BFZ	Tapping Screw 2x4
M 135	XTN3+6B	Tapping Screw 3x6
M 136	XTN3+12B	Tapping Screw 3x12
M 137	QJT0015	Lug Terminal
M 138	QKF2105	Cassette Holder
M 139	QBP1923	Holder Spring
M 140	QBN1937	Eject Spring
M 141	XUB5FT	Stop Ring
M 142	QWY4122Z	Record/Playback Head
M 143	QWY2138Z	Erase Head

